ATTENTION AS A REINFORCER FOR THE BEHAVIOR OF YOUNG CHILDREN IN EARLY EDUCATION CLASSROOMS

BY

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Submitted to the graduate degree program in Applied Behavioral Science and the Graduate Faculty of the University of Kansas in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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Date approved: 12/16/13

Abstract

Although it is clear that attention is an important variable in the acquisition and maintenance of behavior (appropriate and inappropriate), further investigation into the characteristics of attention that affect its reinforcing value is warranted. The purpose of this study was to a) determine the types of attention typically delivered in the classrooms within a local early childhood education center, b) determine potential relationships between teacher attention and child behavior in early childhood education classrooms, and c) evaluate the reinforcing effectiveness of different types of attention. The amount and type of attention typically delivered in preschool classrooms and potential relationships between teacher attention and child behavior were identified through descriptive analyses of three early childhood education classrooms. The reinforcing effectiveness of a given type of attention on levels of activity engagement was evaluated with 14 young children. Types of attention assessed included verbal attention, physical attention, and facial expressions.

Acknowledgements

I would like to acknowledge all who have helped me in completing this dissertation. I would like to thank my advisor, Dr. Pam Neidert, for her guidance and influence throughout the completion of my dissertation. I would also like to express my sincere gratitude to my dissertation committee, Drs. Claudia Dozier, Jan Sheldon, Jim Sherman, and Michael Wehmeyer for their help in refining my dissertation. I am thankful to my fellow graduate students for their assistance in the conceptualization of this project and to the undergraduates in the Neidert lab for their help with conducting sessions. Finally, special thanks to my husband, Wes, and son, Mason, for their patience and support.

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Attention as a Reinforcer for the Behavior of Young Children in Early Education Classroom

Social reinforcement is probably the most commonly used type of reinforcer in applied behavior analysis (Vollmer & Hackenberg, 2001). More specifically, *attention* has been shown to be a highly influential source of social reinforcement for the acquisition and maintenance of a wide range of behavior, both appropriate and inappropriate. Behavior can be influenced both by contingent attention and contingent removal of attention (i.e., social avoidance). Attention is ubiquitous throughout all aspects of life, especially in early childhood. "Attention" refers to any social mediation from one individual to another individual (Packard, 1970), and it is thought to be a critical component in child and adolescent development (Novak & Pelaez, 2004). Attention is also one of the most commonly used components of reinforcement-based strategies for increasing appropriate behavior and decreasing inappropriate behavior. Cooper, Heron, and Heward (2007) referred to adult attention as " one of the most powerful and generally effective types of reinforcement for children" (pg. 273). Adult attention is used to help children learn what behaviors will be deemed socially appropriate or inappropriate and to shape a wide range of appropriate behaviors in early childhood (e.g., verbal behavior, social behavior, motor behavior, and academic behavior). In addition, various types of attention have been shown to be influential for increasing appropriate behavior (e.g., Clements & Tracy, 1977; Kazdin & Klock, 1973) and decreasing inappropriate behavior (e.g., Fisher, Ninness, Piazza, & Owen-Deschryver, 1996; LeBlanc, Hagopian, Marhefka, & Wilke, 2001; Kodak, Northup, and Kelley, 2007; Piazza et al., 1999) in children.

Appropriate Behavior Influenced By Attention

Critical developmental domains. A wide range of skill domains are addressed in early

childhood education, and the ubiquitous nature of attention makes it ideally suited for use in increasing appropriate behavior within each of the skill domains. The position of The National Association for the Education of Young Children (NAEYC) is that an educational curriculum that emphasizes cognitive, language, physical, social, and emotional development is developmentally appropriate for young children (NAEYC, 2009). Since the conception of the field, applied behavior analysis has addressed the influence of attention within motivational and instructional domains with respect to these general areas of child development. For example, it is clear that although physical development occurs within the constraints of muscle development, experiences in the environment (such as receiving adult attention) can shape the behaviors that occur and could account for similarities in individuals' motor behaviors (Schutte, 1995).

Verbal and nonverbal forms of attention have been used to increase a wide variety of appropriate, adaptive behavior within each of the skill domains such as on-task behavior (e.g., Allday & Pakurar, 2007), self-help skills (e.g., Poche, McCubbrey, & Munn, 1982), communication (Novak & Pelaez, 2004), outdoor play skills (e.g., Johnston, Kelley, Harris, & Wolf, 1966), peer interaction (e.g., Allen, Hart, Buell, Harris & Wolf, 1964) and many others. In a series of papers on social positive reinforcement, researchers at the University of Washington, led by Montrose Wolf, demonstrated that positive reinforcement, in the form of attention, plays a prominent role in early childhood development (e.g., Allen et al., 1964; Harris, Johnston, Kelley, & Wolf, 1964; Hart, Allen, Buell, Harris, & Wolf, 1964; Johnston et al., 1966). These researchers showed that adult attention could be used to increase verbal skills (Hart et al. 1964), social skills (Allen et al., 1964), and gross motor skills (Harris et al., 1964; Johnston et al., 1966) in young children. The findings of these seminal studies showing the reinforcing efficacy of adult attention for increasing the behavior of young children are thought to be influential in

common caregiver and teacher training procedures on how to interact with young children (Risley, 2005). Risley (2005) noted that the findings of these studies on social reinforcement are "arguably the most influential discovery of modern psychology."

*Verbal behavior***.** In a rudimentary sense, verbal behavior is defined as behavior that is mediated by another individual's behavior (Skinner, 1957). For example, attention is often delivered following successful approximations to verbal behavior (e.g., babbling), and is thus involved in the development and maintenance of behavior as early as infancy (e.g., Spitz, 1949). Numerous studies have demonstrated that early verbal behavior can be shaped by attention (e.g., Pelaez, Virues-Ortega, & Gewirtz, 2011; Poulson, 1983; Reynolds & Risley, 1968; Rheingold, 1956; Rheingold et al., 1959; Routh, 1969; Thompson, Cotnoir-Bichelman, McKerchar, Tate, & Dancho, 2007; Todd & Palmer, 1968; Weisberg, 1963).

In addition to shaping verbal behavior, receiving high levels of verbal attention starting in infancy has been correlated with increased verbal repertoires (Hart & Risley, 1995). Hart and Risley (1995) conducted one of the first longitudinal studies examining language development in young children. The study included forty-two young children from three different socioeconomic classes (i.e., welfare families, working-class families, and professional families). The children were observed and a one-hour audiotape recording was collected once per month for 2.5 years. The authors found that adult verbal attention was provided to the children when they were in their infancy an average of 28 min per hour sample. However, the number of words spoken by the parents to the children differed based on socioeconomic backgrounds. The children in the professional families received higher quality attention (larger vocabulary and more affirmations), followed by the children in the working-class families, and then the children in the welfare families. In the end, the children from the professional families exhibited a much larger number

of words in their vocabulary as compared to the other two groups, and the children in the welfare family exhibited the smallest vocabulary. Naturalistic observations similar to Hart and Risley's could be conducted to determine the types of attention delivered in early childhood education classrooms and the relationship between adult attention and child behavior in early childhood education classrooms.

As children age, more complex verbal behavior is shaped by the attention they receive in their environment. Skinner (1957) suggested that attention helps to establish basic verbal operants (e.g., mand, tact, echoic, and intraverbal), classes of verbal behavior that have the same effect on the listener. Skinner defined mands as verbal behavior in which the response form is controlled by a current establishing operation and a history of being followed by a specific type of consequence. That is, mands are essentially requests for specific reinforcers. Researchers have found that teaching mands for attention can help decrease attention-maintained problem behavior (e.g., Lambert, Bloom, Irvin, 2012) and can help facilitate social interaction (e.g., Taylor & Hoch, 2008).

Attention also plays a role in the acquisition of tacts (e.g., Braam & Sundberg, 1991; Lowe, Horne, Harris, & Randle, 2002; Lowe, Horne, & Hughes, 2005; Partington & Bailey, 1993; Peine, Gregersen, & Sloane, 1970; Sigafoos, Doss, Reichel, 1989; Sigafoos, Reichle, Doss, Hall, & Pettitt, 1990; Woods, 1984). Tacts are verbal responses, in which the response form is controlled by an immediately prior nonverbal stimulus, which are maintained by generalized reinforcement (e.g., signs of approval by the listener). For example, saying the word "dog" in the presence of a dog. Children learn to say "dog" in the presence of a dog and not the presence of another animal through differential reinforcement in the form of attention (e.g., a caregiver saying, "That's right! That is a dog!").

Echoics are also dependent on attention (e.g., Poulson, Kymissis, Reeve, Andreatos, & Reeve, 1991). Skinner defined echoics as verbal responses in which the controlling antecedent stimulus and form of the response are in the same mode and resemble each other in the physical sense. That is, echoics essentially involve saying words you hear. For example, repeating the word "hi" when told, "say hi." Many researchers have used attention in combination with edible and leisure items (and various other procedures) to increase the echoic behavior of young children and individuals with intellectual and developmental disabilities (e.g., Poulson, Kymissis, Reeve, Andreatos, & Reeve, 1991; Tarbox, Madrid, Aguilar, Jacobo, & Schiff, 2009).

An additional verbal operant that is influenced by attention in the environment is the intraverbal (Luciano, 1986; Sundberg, San Juan, Dawdy, & Arguelles, 1990; Handelman & Harris, 1980). Skinner defined intraverbals as verbal operants that occur in the presence of other verbal operants but do not resemble each other in the physical sense. For example, saying the word "blue" after hearing the words "red, white, and." Conversation is an example of a more advanced intraverbal repertoire. Like interventions for increasing echoic behavior, attention is often incorporated in intervention packages designed to increase intraverbal behavior (e.g., Handelman & Harris, 1980; Kodak, Fuchtman, Paden, 2012; Luciano, 1986; Polick, Carr, Haney, 2012; Sundberg, San Juan, Dawdy, & Arguelles, 1990).

While it is clear that attention plays a prominent role in the acquisition of verbal operants (i.e., mands, tacts, echoics, and intraverbals), it is unclear if attention alone is effective for teaching verbal operants. As stated previously, most researchers use attention in combination with edible and leisure items when teaching verbal behavior. When attention is combined with edible and leisure items, the reinforcing efficacy of attention alone is unknown. To determine the

role of attention in the acquisition of verbal behavior, attention should be evaluated as a standalone treatment.

*Social behavior***.** Social behavior is behavior that is strengthened or weakened by the behavior of others (Novak & Pelaez, 2004). Social behaviors that are prominent in early childhood include (but are not limited to) initiating and terminating interactions, taking turns, making eye contact, sharing, playing with others, cooperating with others, and displaying social safety skills (e.g., not interacting with strangers, seeking help, reporting problems to adults). Attention plays a role in the development of early social behavior (Novak & Pelaez, 2004). Attention has been shown to play a role in verbal interaction (Emshoff, Redd, & Davidson, 1976; Milby, 1970), peer interaction (Allen et al., 1964; Barton & Ascione, 1979; Pinkston et al., 1973; Strain & Timm, 1974), and even facial expressions (Brackbill, 1958; Cooke & Apolloni, 1976).

For example, Pinkston et al. (1973) increased peer interaction and decreased aggression for a 3-year-old boy through the use of contingent teacher attention and extinction. During the intervention, teachers were instructed to deliver attention to the participant when he engaged in appropriate behavior and not to respond to aggression except to physically separate the participant from his peer and console the peer. This intervention was effective for increasing appropriate social behavior and decreasing aggression with this participant. However, it is unclear which component (i.e., attention or extinction) of the intervention made it effective. To determine the effectiveness of attention for the acquisition of social behavior in young children, attention would need to be evaluated as a standalone treatment. In some instances, it might be the case that attention is not an effective reinforcer for increasing appropriate social behavior.

Insensitivity to attention as a reinforcer can have detrimental effects on the development of social behavior (Bijou & Baer, 1961). This situation is commonly observed with children

diagnosed with autism spectrum disorders (ASD) who often show both social deficits and behavioral insensitivity to attention. One of the defining characteristics of ASD is impaired social skills, which can include failure to make eye contact, failure to initiate conversations, failure to respond to bids for social interaction, and failure to maintain social interactions (Hyman & Towin, 2007). When the attention that occurs in the natural environment is likely to be ineffective in the shaping and maintenance of social skills (such as in the case with children diagnosed with ASD), then other forms of reinforcement will be required to teach these important skills. Thus, an assessment to determine the reinforcing efficacy of attention for the behavior of young children seems warranted.

*Motor behavior***.** Motor behavior includes both gross motor development and fine motor development. Gross motor behavior includes skills that involve large muscle (e.g., arms, legs, back) movement such as crawling, walking, running, and climbing. Fine motor behavior includes skills that involve the use of small muscle (e.g., fingers, hands) movement such as grasping objects, writing, and buttoning (Essa, 2011). Contingent adult attention and antecedent-based teaching strategies (e.g., modeling, prompting) have been shown to increase motor skills in early childhood (e.g., Buell, Stoddard, Harris, & Baer, 1968; Correa, Poulson, Salzberg, 1984; Hardiman, Goetz, Reuter, & LeBlanc, 1975; Harris et al., 1964; Johnston et al., 1966; Kirby & Holborn, 1986; Poche, McCubbrey, & Munn, 1982; Vintere, Hemmes, Brown, & Poulson, 2004; Whitman, Zakaras, & Chardos, 1971).

For example, Harris et al. (1964) eliminated the regressed crawling of a young girl in an early childhood education classroom and increased age-appropriate walking behavior with contingent adult attention. A reinforcement-based intervention was introduced in which adult attention was delivered contingent on appropriate standing and walking, and adult attention was

withheld following crawling. The authors found that adult attention was effective for increasing appropriate motor behavior and could be used to motivate young children to engage in appropriate motor behaviors such as walking. Other studies have also demonstrated the use of contingent adult attention for increasing motor skills such as climbing and playing on playground equipment (Buell et al., 1968; Hardiman et al., 1975; Johnston et al., 1966), balancing, walking, ball bouncing, catching, throwing, crawling, rolling, hopping, running, jumping (Kirby & Holborn, 1986), dancing (Vintere et al., 2004), following a variety of gross motor instructions like "sit down" or "clap hands" (Whitman et al., 1971), tooth brushing (Poche et al., 1982), and reaching and grasping (Correa et al., 1984).

Several types of adult attention (e.g., praise, pats, tickles, hugs, kisses) have been used in combination with a variety of procedures (e.g., prompting, modeling, chaining, differential reinforcement, extinction) in intervention packages designed to increase both gross and fine motor skills in young children. However, the use of attention in these intervention packages does not allow for an evaluation of the differential effects of the different types of attention and the effectiveness of contingent attention alone, per se, for increasing gross and fine motor skills in young children. Therefore, the current body of literature on the use of adult attention for increasing motor skills precludes definitive statements about the effectiveness of any single type of attention or the delivery of attention alone for increasing appropriate motor skills. Future research on the use of a variety of types of contingent attention and the use of attention by itself for increasing motor behaviors in young children is warranted.

*Academic behavior***.** Although pre-academic and academic behaviors are important in early childhood education, much of the research conducted on the use of attention for increasing such behavior is conducted with older children in primary school. It is possible that the limited

amount of research in this area with very young children (younger than 6 years) is due either to the ineffectiveness of attention for increasing academic behaviors in this population or that less emphasis is placed on the acquisition of these behaviors in early childhood education settings. As children enter older grades, classroom teachers are often taught to deliver attention to increase appropriate and decrease inappropriate academic behavior in the classroom. Praise is a common form of attention delivered in classrooms for increasing academic behavior (e.g., Goetz & Salmonson, 1972; Kirby & Shields, 1972; O' Leary & O' Leary, 1977; Polick, Carr, & Hanney, 1012; Schutte & Hopkins, 1970; Stevens, Sidener, Reeve, Sidener, 2011; Swanson, 1977)

For example, Schutte & Hopkins (1970) showed that praise and physical attention could be used to increase the preacademic behavior of instruction following with five young girls in a kindergarten classroom. During baseline, these five girls were observed to following teacher instructions approximately 60% of the time. When the teachers were taught to deliver praise and physical attention following instruction following, then instruction following increased to approximately 78% of the time. A return to baseline showed a decrease in instruction following to 69% of the time, and a return to the intervention consisting of attention in the form of praise and physical attention for following instructions resulted in the girls following instructions 84% of the time.

Although contingent attention has been shown to be effective for increasing preacademic behaviors in some early childhood education classrooms, more research is still needed. It is unclear if verbal attention is sufficient for increasing preacademic behaviors in early childhood or if verbal attention needs to be combined with other types of attention, such as physical attention, or strategies, such as prompting, to be effective.

General Discussion of the Use of Attention for Increasing Behavior in Critical Developmental Domains in Early Childhood

Attention has been shown to be a huge part of early childhood and essential to the acquisition and maintenance of critical behaviors during this time. It has been shown that attention is an important component in the development of verbal behavior, social behavior, motor behavior, and academic behavior. However, we still know very little about what makes social consequences (i.e., attention) effective reinforcers, and research still needs to be conducted to identify the types or features of social reinforcement that make it effective (Vollmer & Hackenberg, 2001). Therefore, research should be conducted to determine a) the reinforcing effectiveness of attention as a standalone intervention for increasing the appropriate behavior of young children, b) the types of attention that are being delivered in early education classrooms to young children, and c) the reinforcing effectiveness of those types of attention for the behavior of young children.

Several studies have shown that appropriate classroom behavior can be increased (and inappropriate classroom behavior decreased) when attention is a component of an intervention package (Browder, Hines, McCarthy, & Fees, 1984; Foxx and Shapiro, 1978; Good, Eller, Spangler, & Stone, 1981; Hall, Lund, & Jackson, 1968; Heider, 1979; Kirby & Shields, 1972; Madsen et al., 1968; Malanga & Poling, 1992; Porterfield, Herbert-Jackson, & Risley, 1976; Rosenbaum & Breiling, 1976; Swanson, 1977). Attention is often recommended for use in combination with other treatment strategies, such as extinction (Hall, Lund, & Jackson, 1968; Madsen et al., 1968), punishment (Foxx and Shapiro, 1978; Porterfield, Herbert-Jackson, & Risley, 1976), feedback (Kirby & Shields, 1972), or the delivery of tangible or edible items (Browder, Hines, McCarthy, & Fees, 1984; Foxx & Shapiro, 1978; Good, Eller, Spangler, &

Stone, 1981; Heider, 1979; Malanga & Poling, 1992; Rosenbaum & Breiling, 1976; Swanson, 1977) to increase appropriate behavior in the classroom.

The use of contingent attention in intervention packages provides some information about the value of attention for managing classroom behavior, but using attention as a component of an intervention package limits a complete understanding of the appropriateness of contingent attention per se for increasing the appropriate behavior of young children because it is confounded by the additional components of the intervention package.

There have been some studies that have demonstrated the effectiveness of attention as a standalone intervention in the classroom (Allday & Pakurar, 2007; Gable & Shores, 1980; Hancock, 2002; McLaughlin, 1982; Schutte & Hopkins, 1970; Thomas, Becker, & Armstrong, 1968), but, as stated previously, the majority of the research is conducted in primary and high schools, not in early education classrooms. For example, Gamble and Shore (1980) showed that contingent praise could be used to increase oral reading skills for two participants (age 10 years and 11 years) and Thomas et al. (1968) showed that contingent teacher attention could be used to maintain a variety of appropriate classroom behaviors (e.g., orienting towards the teacher answering questions, raising hand, doing classwork) for children in the seventh grade. In one study done with younger children, Schutte and Hopkins (1970) showed praise and physical attention could be used to increase instruction following with five kindergarten girls. Taken together, this research provides us with preliminary evidence of the usefulness of attention for increasing appropriate behavior in the classroom, but further research on contingent attention as a standalone intervention for increasing the behavior of young children seems warranted for a thorough understanding of the effectiveness of attention.

It is clear that several types of attention including verbal (e.g., praise) and nonverbal types (e.g., pats on the back) of attention exist, attention is ubiquitous in early childhood, attention is used to increase a variety of different behaviors in early childhood education, and that although attention is sometimes used as a standalone intervention, it is more commonly combined with other treatment strategies in intervention packages. Despite the common use and prescription of attention for increasing appropriate behavior and decreasing inappropriate behavior, little is known about the differential effects of different types of attention (Vollmer & Hackenberg, 2001). To further understand the relationship between child behavior and attention, the reinforcing efficacy of different types of attention as a standalone intervention should be experimentally evaluated.

Types of Attention

Attention is unlikely to affect all behavior for all individuals in the same way. Attention may increase behavior, decrease behavior, or have no effect on behavior. Walking into an early education classroom one immediately observes the extent to which attention is a part of almost every activity. Teachers deliver instructions, praise students for jobs well done, read stories, and sing songs. Adults smile and laugh with the children, play games, and give pats on the back. The children, who are at play or work, also deliver attention to one another; they might be playing a reciprocal game or talking about what will be served at lunch. Characteristic factors of attention such as the type of attention that is being delivered may have differential effects on the behaviors of children in the classroom. Therefore, investigating the differential effects of different types of attention may lead to an identification of methods to enhance the effectiveness of attention as a reinforcer.

Verbal and nonverbal attention appears to be the two broad categories of attention.

Researchers have shown that behavior can be differentially sensitive to different types of verbal and nonverbal attention (Kodak et al., 2007; Leblanc et al. 2001; Stephenson & Hanley, 2010; Vollmer, Iwata, Smith, & Rodgers, 1992). For example, Kazdin and Klock (1973) increased the study behavior of 11 children by having teachers deliver *nonverbal* attention (i.e., smiles and physical contact) contingent on appropriate study behavior. During baseline, data were collected on the children's attentive behavior and the teacher's verbal and nonverbal attention. Following baseline, teachers were instructed to increase their delivery of nonverbal attention and not to increase their delivery of verbal attention. The authors found that increasing nonverbal behavior was sufficient for increasing appropriate study behavior for 11 of the 12 children in this study. Thus, nonverbal attention could be used to increase appropriate behavior in this classroom with older children. Future research could determine if increases in nonverbal attention could serve as an effective reinforcer for increasing the behavior of children in early education classrooms.

Richman and Hagopian (1999) found that the destructive behavior of a 6-year-old boy diagnosed with an intellectual disability was sensitive to different types of attention. The authors showed that this child's destructive behavior was maintained by physical attention (i.e., picking the child up and holding the child on the therapists lab), and the destructive behavior was not sensitive to verbal attention. Thus, further demonstrating the need to evaluate the reinforcing efficacy of both nonverbal and verbal types of attention.

Different types of verbal attention (e.g., praise or reprimands) may also have differential effects on behavior. Kodak, Northup, and Kelly (2007) found that different types of attention (i.e., reprimands, unrelated comments, tickles, eye contact, praise, and physical attention) had differential effects on the maintenance of problem behavior exhibited by two children. For one child, problem behavior occurred more frequently when it resulted in contingent verbal attention

in the form of reprimands and contingent physical attention in the form of tickles. For the second child, the authors found that problem behavior occurred more when the participant received contingent verbal attention in the form of reprimands and unrelated comments. This study provides further evidence that behavior can be differentially sensitive to different types of attention. However, future research should determine if the inappropriate behavior exhibited by children in early education classrooms is differentially sensitive to different types of attention.

Piazza et al. (1999) used concurrent schedules of reinforcement to determine the differential effects of praise and reprimands on appropriate and inappropriate behavior displayed by two 11-year-old participants diagnosed with intellectual and developmental disabilities that engaged in attention-maintained inappropriate behavior. During all sessions two sets of task materials were concurrently available to the participants. The task materials were identical other than the color. During baseline, engagement with task materials and inappropriate behavior resulted in no programmed consequences. During contingent attention, engagement with one set of task materials (e.g., blue materials) was associated with reprimands and engagement with the other set of task materials (e.g., red materials) was associated with praise. The contingencies associated with each color task material were reversed across phases. The authors found that the participants engaged more with the toys that resulted in reprimands as compared to the toys that resulted in praise. For one participant, toy engagement was seen exclusively towards the toys associated with reprimands. Thus, indicating that for this participant reprimands were more preferred than praise. A treatment in which inappropriate behavior resulted in extinction was effective for reducing the inappropriate behavior of this participant. For the second participant, the authors evaluated different types of attention to determine if there were other types of attention that were equally or more preferred than reprimands for increasing appropriate behavior

and decreasing inappropriate behavior. For this participant, physical attention in the form of tickles and verbal attention in the form of praise were evaluated in comparison to verbal reprimands. The authors found that physical attention was more preferred than reprimands, and praise was less preferred than reprimands. A treatment involving physical attention for appropriate behavior was effective for increasing appropriate behavior and decreasing inappropriate behavior. The results of the Kodak et al. (2007) and Piazza et al. (1999) studies showed that behavior of some individuals is differentially sensitive to different types of attention. Thus, different types of attention should be evaluated when attention is used as part of a behavior change program. Different types of attention may need to be assessed to find the types that will serve as reinforcers for each individual. The results of these studies suggest that future research should focus on evaluations of both verbal and nonverbal attention when studying the role attention plays on behavior because each form of attention may have differential effects.

Determining the Types of Attention in Early Childhood Education Classrooms

Descriptive analyses can be used to determine what types of attention are commonly used in early education and thus, should be evaluated for increasing the behavior of young children. A descriptive analysis is a direct assessment method that involves observing naturally occurring behavior-environment events in natural settings without manipulating variables suspected to influence behaviors of interest (Mace & Lalli, 1991). The main advantage of descriptive analyses is that they provide information about the occurrence of behavior in the natural environment. Observing behavior in settings where it is most likely to occur can a) help operationally define the behavior of interest, b) provide information about the rate, latency, duration, and/or intensity of the behavior of interest, and c) identify common behavioral consequences, which can be useful when designing experimental conditions (Mace & Lalli, 1991; Samaha et al., 2009). To

date, descriptive analyses have not typically been conducted to determine the likely consequences to *appropriate* behavior in the classroom. Thus, although attention is commonly prescribed to follow appropriate behavior in the classroom, it is unclear if this occurs. Further, it is unclear whether certain types of attention are more (or less) likely to follow child behavior in the classroom.

McKerchar and Thompson (2004) conducted a descriptive analysis to determine the most likely consequence for *inappropriate* behavior in early childhood education classrooms. They observed the inappropriate classroom behavior displayed by 14 young children and found that attention (i.e., vocal or physical social interaction) was the most likely consequence to follow inappropriate behavior. However, escape and access to tangible items also followed inappropriate behavior. Because descriptive analyses have been shown to be effective methods for describing behavior-environment relationships, it seems descriptive analysis methodology is appropriate for gaining a more thorough understanding of the types and amounts of attention typically delivered in early childhood education classrooms and potential relationships between teacher attention and child behavior. Because descriptive analyses can not provide information regarding the reinforcing effectiveness of attention in the classroom, a formal experimental analysis must be conducted to gain a more thorough understanding of the characteristics of attention that make it a valuable consequence for the behavior of young children in early education classrooms.

Study 1: Descriptive Analyses of Attention in Early Childhood Education Classrooms

Three descriptive analyses were conducted using procedures similar to McKerchar and Thompson (2004). The purpose of the first descriptive analysis was to confirm and establish the prevalence of general categories of attention described in the behavior analytic literature (i.e.,

instructions, praise, reprimands, physical attention, and facial attention) in early childhood education classrooms. The purpose of the second and third descriptive analyses was to evaluate the types of attention delivered by teachers in early childhood education classrooms and received by children in those classrooms and to determine potential relationships between teacher attention and child behavior. Thus, these descriptive analyses provided information on the (a) overall probability of teacher attention, (b) probability of different types of teacher attention, (c) probability of appropriate and inappropriate child behavior, and (d) potential relationships between child behavior and teacher attention in early childhood education classrooms.

Descriptive Analysis 1

Participants and Setting

Participants were approximately 47 children who attended one of three inclusive classrooms at a university-based childcare facility and approximately 30 adults who were practicum students or paid staff working in the facility. The numbers are approximate because participants entered and exited the classroom throughout the descriptive analysis. Research and training occurred regularly in the childcare facility such that the children were accustomed to adult observers and visitors. Children in the Toddler classroom ranged in age from 1 year (and walking) to 2.5 years. Children in the Preschool 1 classroom ranged in age from 2.5 years to 3.5 years, and children in the Preschool 2 classroom ranged in age from 3.5 years to 6 years. In all classrooms, the teacher-to-student ratio ranged from 1:2 to 1:6. The maximum class size was 12 children in the Toddler classroom, 20 children in the Preschool 1 classroom, and 22 children in the Preschool 2 classroom.

All practicum-student and staff teachers received training in basic behavior-analytic techniques. Teachers were taught proactive strategies for promoting desirable behavior rather

than undesirable behavior and strategies for handling any instances of inappropriate behavior. Training was provided on establishing an enriched classroom environment. Children had ongoing access to materials, and the teachers were trained to engage in positive interactions throughout the day. In the Toddler classroom, the teachers were instructed to deliver attention to each of the children at least once every 1 to 2 minutes, and in the Preschool 1 and 2 classrooms, the teachers were instructed to deliver attention to each of the children at least once every 3 to 5 minutes. Therefore, teachers were expected to deliver frequent noncontingent attention throughout the day. The teachers were also trained to deliver attention and tangible items following appropriate behavior and not following inappropriate behavior, and prompts were used to increase the likelihood of appropriate behavior. Prompts included verbal directions to engage in a behavior, gesturing or modeling how to engage in a behavior, or physically helping a child engage in a behavior. Embedded teaching was used during play activities to promote learning. Teachers were instructed to model appropriate behavior and to incorporate teaching trials into the ongoing classroom activity. Teachers were also trained to carefully monitor the classroom to prevent inappropriate behavior and to deliver attention following appropriate behavior. Teachers positioned themselves so that the children in the classroom were always in full view. If inappropriate behavior did occur, then teachers were instructed to handle the situation immediately. A time-out procedure was used for all instances of inappropriate behavior (except for when the inappropriate behavior occurred following an instruction) in the Preschool 1 and Preschool 2 classrooms and for instances of biting (except for when biting occurred following an instruction) in the Toddler classroom. The time-out procedure consisted of the teacher immediately removing the child from the area in which the behavior occurred and physically guiding the child to sit on the floor. The child remained in timeout for approximately 1 min. At

the end of the time-out the child was allowed to return to the activity. If inappropriate behavior (other than biting) occurred in the Toddler classroom, then the child was physically redirected to a new activity. In all classrooms, teachers were trained to follow through with instructions using a 3-step prompting procedure if inappropriate behavior occurred following an instruction. Three-step prompting included a verbal prompt (clear and concise instruction), model prompt (physically demonstrating how to engage in the behavior), and physical prompt (physical assistance engaging in the behavior). Verbal instructions were delivered in conjunction with model prompts and physical prompts. Children were given 5-10 seconds to engage in the behavior before moving to the next prompt level. Teachers were trained to avoid delivering attention (other than prompting) following inappropriate behavior. This included training to avoid the use of reprimands and the delivery of materials following inappropriate behavior.

Observations were approximately 7 hours in duration and took place over the course of the regularly scheduled day (9:30 am to 4:30 pm) during ongoing scheduled activities (e.g., free play, circle time, meals, nap, outdoor time, small group, and transitions). Nap was included in the descriptive analysis because it was observed that not all the children in the classrooms went to sleep during the scheduled nap and because teachers were observed to continue delivering attention during the scheduled nap (e.g., pats on the back while the children laid on their cots).

Response Measurement and Interobserver Agreement.

Each classroom was observed for two consecutive days (approximately 7 hours per day). Observers positioned themselves in a way that allowed for the whole classroom to be in view, and data were collected from within the classroom. Pencil and paper data were collected on the types of attention delivered to the children by the adults in the classroom. Data sheets were partitioned into 2-min intervals and observers scored commonly delivered types of adult

behavior, as described in behavior-analytic literature, that were presumed to typically occur in early childhood education classrooms (i.e., positive statements, reprimands, instructions, physical interaction, facial expressions). A positive statement was defined as any vocal expression of approval or neutral statement that was not a reprimand or instruction (e.g., "Good job," "Good job stacking the blocks," "We are going to have a lot of fun today"). Reprimand was defined as any vocal expression of disapproval (e.g., "Don't do that!"). Instruction was defined as any statement requiring a response from a child; statements of command, demand, or question (e.g., "Say potty," "What did you eat for lunch today" "Match the colors"). Physical attention was defined as physical contact with the child (e.g., pats on the back or physical prompting). Facial expressions were defined as turning the mouth up into a smiling position, nodding the head in approval or disapproval, opening and closing one eye in a wink, or making eye contact with a child. Multiple adult behaviors could occur in one interval and all behaviors were scored that occurred in a particular interval.

A second observer independently recorded data during a minimum of 33% of intervals. An agreement was scored if both observers recorded the occurrence or nonoccurrence of the same behavior in the same 2- min interval. Agreement scores were calculated using an interval method of agreement for each behavior. The number of agreements was divided by the number of agreements plus disagreements and multiplied by 100. Mean interobserver agreement was 98% for positive statements, 89% for facial expression, 97% for reprimands, 94% for physical attention, and 97% for instructions.

The overall probability of each type of attention in each of the three classrooms was calculated by summing the number of intervals in which a given type of attention occurred and dividing by the total number of intervals in the session.

Results and Discussion

Results of Descriptive Analysis 1 are depicted in Figure 1. In all classrooms, high levels of positive statements, positive facial expressions, physical attention, and instructions were observed. In addition, low levels of attention in the form of reprimands were observed.

The high level of teacher attention in the form of positive statements, positive facial expressions, and physical attention and the low level of teacher attention in the form of reprimands in all three classrooms was not surprising given the training that the teachers received. What was somewhat surprising was the high levels of instructions in all three classrooms. The high levels of instructions seen in all three classrooms could have been a result of the operational definition that was used. That is, instructions were defined as any statement that required a response from the child. Thus, if the teacher and the child were interacting and the teacher asked questions such as "Would you like to read a book?" or "What did you have for lunch today?", then this was scored as an instruction. Given the training that the teachers received, it is likely that the teachers were using embedded teaching, which involved instructions, and that the teachers and children were engaged in conversations in which the teachers asked the children questions resulting in what appeared to be a high probability of instructions.

These results provide a broad account of the types and amount of attention delivered in these early education classrooms. The results of this descriptive analysis indicated that adult attention was prevalent in all three of the early childhood education classrooms that were observed. The limitation of this descriptive analysis is that it does not allow for a thorough analysis of the types of attention delivered by specific teachers or received by specific children. In addition, it does not allow for an evaluation of the relationship between teacher attention and

child behavior. Therefore, Descriptive Analysis 2 and 3 were conducted to give a more molecular account of the occurrence of different types of adult attention and child behavior and to determine potential relationships between adult and child behavior in early education classrooms.

Descriptive Analysis 2

Participants and Setting

Participants were 12 teachers from the classrooms described in Descriptive Analysis 1. Participants were selected based on attendance and availability. Four teachers were observed from each classroom. Two of the teachers worked on the morning shift (7:30a.m. -11:30a.m.), and two of the teachers work on the afternoon shift (1:45p.m. -5:45p.m.) in each of the three classrooms. There was one male teacher observed in Preschool 1 (Teacher 1), and all other teachers were females. All teachers had received training in basic behavior-analytic techniques.

Response Measurement and Interobserver Agreement

All observations were 10 min in length and were videotaped from within the classroom. Each teacher was observed twice. Observations were conducted across days and a single teacher was not observed more than once per day. Videos were later viewed and pencil-and-paper data were collected on the types of attention delivered to the children by the adults in each of the classrooms and on appropriate and inappropriate child behavior. Data sheets were partitioned into 10-sec intervals, and observers scored commonly delivered types of adult attention that were observed to occur in Descriptive Analysis 1 (i.e., verbal attention in the form of praise, reprimand, instruction, and neutral verbal attention; physical attention in the form of positive physical attention, physical prompt, neutral physical attention, and materials delivered; facial attention in the form of positive facial expressions, negative facial expressions, neutral facial

expressions, and eye contact) and child behavior (appropriate and inappropriate). Data were collected on the appropriate and inappropriate behavior of any of the children in that teacher's proximity and the target teacher's delivery of different types of attention. Reprimand and instruction were defined using the same definitions as Descriptive Analysis 1. Praise was defined as any vocal expression of approval (e.g., "Good job," "Good job stacking the blocks"). Neutral verbal behavior was defined as vocal expressions that were not praise, reprimands, or instructions (e.g., "It is nice outside today."). Positive physical attention was defined as physical contact between a child and teacher that was not part of physical prompting (e.g., pats, hugs, tickles). Physical prompting was the use of physical guidance to assist a child with engaging in an activity or physically placing a child in time-out. Neutral physical attention was defined as the use of response blocking to cease a behavior (e.g., using hands to block hits or kicks during a tantrum). Materials delivered was defined as the teacher handing materials to the child. Positive facial expressions were defined as turning the mouth up into a smiling position, nodding the head in approval, or opening and closing one eye in a wink. Negative facial expressions were defined as movement of the head in a side-to-side disapproving manner. Neutral facial expressions were defined as looking at the child but not engaging in positive or negative facial expressions. Eye contact was defined as teacher and child facing each other and looking into one another's eyes. Appropriate child behavior was defined as engaging with materials in the way that they were intended for use, engaging in appropriate interactions, sitting during circle times, and following instructions, and all other behavior that was not considered inappropriate behavior. Inappropriate child behavior was defined as any physical contact or attempted contact that could result in harm to another person, damaging or engaging with materials in a way that could cause damage, engaging in behavior that could result in self injury, taking a toy from another child without

permission, and noncompliance with instructions. Multiple adult and child behaviors could occur in one interval and all behaviors were scored that occurred in a particular interval. Videotapes could be paused and rewound to ensure that all instances of behavior that occurred in each 10-sec interval were captured.

A second observer independently recorded data during 50% of observations. An agreement was scored if both observers recorded the occurrence or nonoccurrence of the same behavior in the same 10-s interval. Agreement scores were calculated using an interval agreement for each of the behaviors. The number of agreements was divided by the number of agreements plus disagreements and multiplied by 100. Mean interobserver agreement for adult attention was 94% (range 60%-100%), and mean interobserver agreement for child behavior was 95% (range 73%-100%).

Data Analysis

Following the observations, several probabilities were calculated to determine the overall background probability of each type of attention, the conditional probability of each type of attention given appropriate child behavior, and the conditional probability of each type of attention given inappropriate child behavior.

The background probability of teacher attention was calculated by summing the number of intervals with each type of teacher attention and dividing by the total number of intervals in the observation. The background probability of child behavior was calculated by summing the number of intervals with child behavior (appropriate behavior or inappropriate behavior) and dividing by the total number of intervals in the observation.

The conditional probability of each type of attention (i.e., verbal, physical, facial) and each subtype of attention (i.e., praise, reprimand, instruction, neutral verbal, positive physical

attention, physical prompt, neutral physical attention, materials provided, positive facial, negative facial, neutral facial, and eye contact) was calculated by summing the number of intervals with consequent types of attention (attention observed in the interval following appropriate or inappropriate child behavior) and dividing by the number of intervals with appropriate child behavior (to determine the likelihood of a specific type of attention following appropriate child behavior) and inappropriate behavior (to determine the likelihood of a specific type of attention following inappropriate child behavior).

To determine potential relationships between child behavior and teacher attention, the conditional probabilities were compared to the background probabilities (Camp, Iwata, Hammond, & Bloom, 2009). If the conditional probability of a specific type or subtype of attention was higher than the background probability of that event, then it was considered a positive contingency (Vollmer and Hackenberg, 2001). For example, if the conditional probability of praise following appropriate behavior was .5 and the background probability of praise was .2, then this suggests a potential positive contingency between praise and appropriate behavior. Therefore, an increased probability of appropriate child behavior would likely result in an increased probability of that type of attention (i.e., praise).

Results

Results of Descriptive Analysis 2 are depicted in Figures 2-8. Figure 2 depicts overall background probabilities of each general type of attention (verbal, physical facial), conditional probabilities of each type of attention given appropriate child behavior, and conditional probabilities of each type of attention following inappropriate child behavior across all three classrooms High background probabilities of appropriate child behavior (range .86-.99) and low

background probabilities of inappropriate child behavior (range .01-.06) were observed in all three classrooms.

High background probabilities of verbal (range .85-.91) and facial attention (range .95-.99) were observed in all three classrooms, whereas low background probabilities of physical attention (range .05-.26) were observed. The only instances where the conditional probability was relatively higher than the background probability of an event were observed in the Toddler and Preschool 1 classrooms. In both classrooms, the probability of physical attention following inappropriate behavior (.56 and .38, respectively) was relatively higher than the background probability of physical attention (.26 and .17, respectively). Thus, the delivery of physical attention following inappropriate behavior was more probable than the probability of physical attention per se in both the Toddler and Preschool 1 classrooms suggesting a potential positive contingency between inappropriate child behavior and physical attention in these classrooms.

Figures 3-5 depict overall background probabilities of each attention subtype, conditional probabilities of each attention subtype given the occurrence of appropriate child behavior, and the conditional probabilities of each attention subtype given the occurrence of inappropriate child behavior. Figure 3 depicts the probability of different subtypes of attention in the Toddler classroom. The subtypes of verbal attention with the highest background probability of occurring were instructions (.55) and neutral statements (.55). All subtypes of physical attention had a low probability of occurring, but the physical attention subtype with the highest background probability of occurring was positive touch (.2). The subtype of facial attention with the highest background probability of occurring was neutral facial expressions (.7). The teachers were not observed to deliver attention in the form of reprimands or negative facial expressions in the Toddler classroom, and neutral physical attention had a very low probability of occurrence

(.005). In this classroom, the conditional probability of prompts given inappropriate behavior (.37) was greater than the background probability of prompts (.05). This suggests a potential relationship between inappropriate child behavior and teacher prompts. All other conditional probabilities were relatively equal to the background probabilities of the event.

In the Preschool 1 classroom (Figure 4), the subtype of verbal attention with the highest background probability of occurring was instructions (.59). All subtypes of physical attention had a low probability of occurring in the Preschool 1 classroom, but the subtype of physical attention with the highest background probability of occurring was the delivery of materials (.09). The subtype of facial attention with the highest background probability of occurring in the Preschool 1 classroom was neutral facial expressions (.88). Reprimands and neutral physical attention were not observed in this classroom and a very low probability of negative facial expressions was observed (.006). Potential positive contingencies were observed between positive physical attention and inappropriate behavior, prompts and inappropriate behavior, and neutral facial expressions and inappropriate behavior. The probability of positive physical attention following inappropriate behavior (.25) and prompts following inappropriate behavior (.13) was greater than the background probabilities of these events (.06 and .02, respectively). In addition, the probability of neutral facial expressions following inappropriate behavior (1.0) was relatively higher than the background probability of neutral facial expressions (.88). These results suggest that positive physical attention, prompts, and neutral facial expressions were more likely to occur following inappropriate behavior than at any other time.

Figure 5 depicts the probability of different subtypes of attention delivered in the Preschool 2 classroom. In this classroom, the verbal attention subtype with the highest background probability of occurring was neutral statements (.67). Physical attention had a very

low probability of occurring in the Preschool 2 classroom. The highest background probability of any physical attention subtype was .03 (positive physical attention). The facial attention subtype with the highest background probability of occurring in the Preschool 2 classroom was neutral facial expressions (.95). Reprimands and negative facial expressions had a very low probability (.003 and .004, respectively) of occurring in this classroom, and neutral physical attention did not occur. A relatively high probability of instructions following inappropriate behavior (.66), compared to the background probability of instructions (.54), was observed in the Preschool 2 classroom. These results suggest a potential positive contingency existed between instructions and inappropriate behavior in the Preschool 2 classroom

Figures 6-8 depict individual teacher's background probability of delivering each subtype of attention, and the conditional probability of individual teachers delivering each of the subtypes of attention following appropriate and inappropriate behavior. Figure 6 depicts attention delivery from each of the teachers in the Toddler classroom. For Teacher 1 in the Toddler classroom, the subtypes of attention with the highest background probability of occurring were neutral statements (.70), neutral facial attention (.69), and instructions (.61). This teacher was not observed to deliver reprimands, prompts, or negative facial expressions. For Teacher 1, the probability of instructions and neutral statements following inappropriate behavior (1.0) was relatively higher than the background probability of these events (.61 and .70, respectively) suggesting that there was a potential contingency between instructions and inappropriate behavior and neutral statements and inappropriate behavior.

The subtypes of attention with the highest background probability of being delivered by Teacher 2 in the Toddler classroom were neutral facial expressions (.73) and instructions (.46). This teacher did not deliver reprimands or negative facial expressions. For Teacher 2, the

conditional probability of prompts given inappropriate behavior (.50) and eye contact given inappropriate behavior (.17) was relatively higher than the background probability of these events (.03 and .10, respectively) suggesting a potential positive contingency between prompts and inappropriate behavior and eye contact and inappropriate behavior.

The subtypes of attention with the highest background probability of being delivered by Teacher 3 in the Toddler classroom were neutral facial expressions (.59), neutral statements (.58), instructions (.53), and positive facial expressions (.51). Teacher 3 was not observed to deliver reprimands, neutral physical attention, or negative facial expressions. For Teacher 3, the conditional probability of prompts given inappropriate behavior (.46) was relatively higher than the background probability of prompts (.08) suggesting that there was a potential positive contingency between prompts and inappropriate behavior.

In the Toddler classroom, Teacher 4 had a high background probability of delivering neutral facial expressions (.71), instructions (.60), and neutral statements (.53). Teacher 4 was not observed to deliver reprimands, neutral physical attention, or negative facial expressions. For Teacher 4, several potential positive contingencies existed between teacher attention and inappropriate child behavior. There were relatively higher conditional probabilities of praise (.50), neutral statements (.75), positive physical attention (.25), prompts (.25), and neutral facial expressions (1.0) given inappropriate behavior as compared to the background probabilities (.22, .53, .15, .07, .71, respectively) of these events. These results suggest that Teacher 4 in the Toddler classroom was more likely to deliver these five types of attention following inappropriate behavior than at any other time.

Figure 7 depicts the different subtypes of attention delivered by each of the four teachers in the Preschool 1 classroom. For Teacher 1 in the Preschool 1 classroom, the most probable

subtypes of attention delivered were neutral facial expressions (.78) and neutral statements (.48). Teacher 1 did not deliver reprimands, prompts, neutral physical attention, or negative facial expressions. Given the occurrence of inappropriate behavior, neutral statements and neutral facial expressions had a relatively high probability of occurring (.75 and 1.0, respectively) compared to their background probability of occurring (.48 and .78, respectively). These results suggest that this teacher was more likely to deliver neutral statements and neutral facial expressions following inappropriate behavior than at any other time.

Teacher 2 in the Preschool 1 classroom had a high probability of delivering neutral facial expressions (.97), neutral statements (.55), and instructions (.54). Teacher 2 did not deliver reprimands or neutral physical attention. For this teacher, the conditional probability of prompts given inappropriate behavior (.50) was relatively higher than the background probability of prompts indicating a potential positive contingency between prompts and inappropriate behavior.

Teacher 3 in the Preschool 1 classroom had a high probability of delivering neutral facial expressions (.87), neutral statements (.73), and instructions (.68). Teacher 3 did not deliver reprimands, prompts, neutral physical attention, or negative facial expressions. For this teacher, a comparison of the conditional and background probabilities of attention did not indicate any positive contingencies between the different subtypes of teacher attention and child behavior.

For Teacher 4 in the Preschool 1 classroom, the most probable subtypes of attention delivered were neutral facial expressions (.92) and instructions (.77). Teacher 4 did not deliver reprimands or neutral physical attention. For this teacher, the conditional probability of instructions and positive physical attention given inappropriate behavior (1.0) was relatively higher that the background probability of instructions (.77) and positive physical attention (.11).

This suggests a potential positive contingency between instructions and inappropriate behavior and prompts and inappropriate behavior.

Figure 8 depicts the probability of the delivery of each of the subtypes of attention by the teachers in the Preschool 2 classroom. In the Preschool 2 classroom, inappropriate child behavior did not occur while observing Teacher 1, Teacher 3, or Teacher 4. All teachers in the Preschool 2 classroom had a high background probability of delivering neutral facial expressions (.94, .93, .97, .95, respectively), instructions (.56, .53, .50, .57, respectively), and neutral statements (.41, .78, .63, .67, respectively). Teacher 4 also had a high background probability of delivering eye contact (.64). For three of the teachers, Teacher 1, Teacher 3, and Teacher 4, positive contingencies between child behavior and the different subtypes of attention were not observed. For Teacher 2, there was a potential positive contingency observed between instructions and inappropriate behavior. That is, the conditional probability of instructions given inappropriate behavior (.67) was relatively higher than the background probability of instructions (.53). The conditional probability of Teacher 2 delivering eye contact and neutral facial expressions given inappropriate behavior (.17 and 1.0, respectively) was also somewhat higher than the background probabilities (.09 and .93, respectively) of these events. This suggests that potential positive contingencies might have also existed between eye contact and inappropriate behavior and neutral facial expressions and inappropriate behavior.

Discussion

In Descriptive Analysis 2, we attempted to evaluate the types (and subtypes) of attention delivered by teachers in early childhood education classrooms. For all three classrooms, we observed that appropriate behavior had a much higher probability of occurring than inappropriate behavior. One limiting implication of the high probability of appropriate behavior and the low

probability of inappropriate behavior is that the probabilities of attention following inappropriate behavior might be slightly misleading because there were not very many occurrences of inappropriate behavior from which to compare consequent types of attention. It should also be noted that all observations were conducted in early childhood education classrooms in which all teachers had received training in basic behavior-analytic techniques. Therefore, it is unclear whether this pattern of child behavior (i.e., high probability of appropriate behavior and low probability of inappropriate behavior) is representative of child behavior in other early childhood programs.

Interestingly, there were only slight differences in the occurrence of appropriate and inappropriate child behavior and in the delivery of attention in each of the three classrooms. The youngest classroom was observed to have slightly more inappropriate behavior than the other two classrooms, and the Preschool 2 classroom had the least amount of inappropriate behavior. Perhaps not surprisingly, the Toddler classroom had slightly more physical attention delivered when compared to the other two classrooms, and the Preschool 2 classroom had the least amount of physical attention delivered. The higher probability of physical attention in the Toddler classroom could be the result of the higher levels of inappropriate behavior observed, or the children requiring more physical help completing activities than the older children.

Overall, verbal and facial attention had a high background probability of occurring in all three classrooms, and physical attention had a low background probability of occurring in all three classrooms. The conditional probability of verbal and facial attention following appropriate and inappropriate behavior was high across all three classrooms. However, overall, the only potentially positive contingencies between child behavior and teacher attention observed were in the Toddler and Preschool 1 classrooms in which physical attention following inappropriate

behavior had a higher probability than the background probability of physical attention. One possible reason for this might be that time-out was a programmed consequence for many of the behaviors considered inappropriate in these classrooms, and time-out consisted of physically guiding the child away from the ongoing activity. In addition, the teachers were trained not to deliver other forms of attention (i.e., verbal attention) following many of the behaviors considered inappropriate.

Overall, the conditional probabilities of verbal attention and facial attention were roughly equivalent (or less than) the background probabilities of these events suggesting the absence of a contingent relationship. That is, the teachers were likely delivering so much verbal and facial attention noncontingently, that it was not possible to determine a contingent relationship between these types of attention and child behavior when looking at the classroom as a whole.

The most common subtypes of verbal attention delivered in all three classrooms were instructions and neutral statements. In the Preschool 2 classroom, the conditional probability of instructions given inappropriate behavior was greater than the background probability of instructions. This suggests that in this classroom instructions were more likely to occur following inappropriate behavior than at any other time. This could be the result of teachers repeating instructions following inappropriate behavior or delivering more instructions following inappropriate behavior. It is possible that the age of the children influenced the teacher's probability of delivering verbal instructions rather than physical prompts in the Preschool 2 classroom. Presumably, the children in the Preschool 2 classroom had a more extensive verbal repertoire compared to the children in the other two classrooms, which might have influenced the teachers' expectations for them to follow verbal instructions, thus, resulting in more verbal instructions when inappropriate behavior was occurring.

Praise had a low to moderate probability of occurring in all three classrooms. This is somewhat surprising given the high probability of appropriate behavior and the teacher's training, which involved learning to praise appropriate behavior. In the Toddler classroom, praise was observed to occur following inappropriate behavior. Closer inspection of the data revealed that the majority of the time that praise occurred following inappropriate behavior, appropriate behavior had also occurred in the same interval as inappropriate behavior. However, on three instances praise was observed to occur following only inappropriate behavior. Thus, even teachers who have had training in basic behavior-analytic techniques might occasionally deliver approving forms of attention (i.e., praise) following inappropriate behavior.

It was also the case that a potential positive contingency was observed between positive physical attention and inappropriate behavior in the Preschool 1 classroom. However, closer inspection of the data suggested that appropriate behavior was observed to occur in the same interval as inappropriate behavior preceding positive physical attention in all instances. Therefore, it is unclear if there was a positive contingency between positive physical attention and inappropriate behavior or if the positive physical attention was being delivered contingent on appropriate behavior.

All subtypes of physical attention had a low probability of occurring in all three classrooms. Positive physical attention and delivery of materials were the most probable background subtypes of attention in all three classrooms. A potential positive contingency between physical prompts and inappropriate behavior was observed in the Toddler and Preschool 1 classrooms. Given the age of the children, it is likely that physical prompting was used to help the children follow through with the completion of demands, or, as suggested previously, when placing the children in time-out. It is also possible that as children age, less physical attention

might be delivered and that is why the probability of physical attention was higher in the Toddler and Preschool 1 classroom compared to the Preschool 2 classroom.

The most probable form of attention in all three classrooms was neutral facial expressions. Positive facial expressions had a low to moderate probability of occurring in all three classrooms, and negative facial expressions had a low to zero probability of occurring. It is unclear if it is common practice in early childhood education classrooms to maintain neutral or positive facial expressions, even after the occurrence of inappropriate behavior, but it was observed to occur in these three classrooms. In the Preschool 2 classroom, a potential positive contingency was observed between neutral facial expressions and inappropriate behavior. It is possible that the teachers were more likely to look in the child's direction (without showing facial approval or disapproval) when inappropriate behavior was occurring, resulting in a potential positive contingency between neutral facial expressions and inappropriate child behavior.

Possible positive contingencies between child behavior and different subtypes of individual teacher attention were idiosyncratic across all the teachers in all the classrooms. This suggests that all teachers are not likely to respond the same way to appropriate and inappropriate child behavior in early childhood education classrooms. Therefore, more information on the influence of different subtypes of attention on child behavior is needed. It is interesting that reprimands, neutral physical attention, and negative facial expressions had a low to zero probability of being delivered by the teachers in all three classrooms, even when inappropriate behavior was observed. Again, it is unclear if this was a result of the training the teachers in these classrooms received or if these forms of attention have a low probability of occurring in all early childhood education classrooms.

The results of Descriptive Analysis 2 provided a great deal of information about the occurrence of teacher attention and the relationship between teacher attention and child behavior in early childhood education classrooms. However, Descriptive Analysis 2 does not provide information about the types of attention received following the behavior of any specific child in the classrooms. Therefore, the purpose of Descriptive Analysis 3 was to evaluate the types and subtypes of attention received by specific children in early childhood education classrooms and to determine potential relationships between child behavior and teacher attention.

Descriptive Analysis 3

Participants and Setting

Participants were 9 children from the classrooms described in Descriptive Analysis 1. Participants were selected based on attendance and availability. Participants in the Toddler classroom included three males, age 17 months (Child 3), 24 months (Child 2), and 26 months (Child 1). Participants in the Preschool 1 classroom included one female age 2 years 8 months (Child 1) and two males, age 2 years 11 months (Child 2) and 3 years 1 month (Child 3). The participants in the Preschool 2 classroom were two females, age 4 years 1 month (Child 1) and 4 years 2 month (Child 2), and one male, age 3 years 11 months (Child 3). All child participants were typically developing.

Response Measurement and Interobserver Agreement

All observations were 10 min in length and were videotaped within the child's classroom. Each child was observed four times (twice in the a.m. and twice in the p.m.). Data were collected on the appropriate and inappropriate behavior emitted by that specific child and attention delivered to that child by any of the teachers in the classroom. Data were collected and analyzed using the same methods and definitions described in Descriptive Analysis 2.

Interobserver agreement was calculated using the same method described in Descriptive Analysis 2. A second observer independently recorded data during 25% of observations. Mean interobserver agreement for adult attention was 95% (range 70%-100%), and mean interobserver agreement for child behavior was 97% (range 85%-100%).

Results

Figures 9- 11 depict the background probability of different types of attention and conditional probability of different types of attention given the appropriate and inappropriate behavior displayed by each of the three children in each of the classrooms. Figure 9 depicts background and conditional probabilities of the types of attention received by the three children in the Toddler classroom. All children in the Toddler classroom were observed to have a very high probability of appropriate behavior (1.0, .99, .99, respectively) and a very low probability of inappropriate behavior (.05, .010, .08, respectively). All children in the Toddler classroom were observed to have a high background probability of receiving verbal attention (.66, .58, .50, respectively), and a low to moderate background probability of receiving physical (.34, .25, .21, respectively) and facial (.45, .29, .28, respectively) attention. For Child 1, the levels of background attention and conditional attention were relatively similar. Therefore, potential positive contingencies between child behavior and teacher attention could not be determined. The results were similar for Child 2. However, the conditional probability of physical attention following inappropriate behavior (.33) was somewhat higher than the background probability of physical attention (.25). This suggests a possible positive contingency between physical attention and inappropriate behavior for Child 2. For Child 3, the conditional probability of verbal attention, physical attention, and facial attention following inappropriate behavior (.58, .74, .58, respectively) was greater than the background probability (.53, .21, .28, respectively) of

receiving these forms of attention. Therefore, for Child 3 these forms of attention were more likely to occur following inappropriate behavior than at any other time.

Figure 10 depicts background and conditional probabilities of the types of attention received by the three children in the Preschool 1 classroom. There was a high probability of appropriate behavior (1.0, .99, .98, respectively) and a low probability of inappropriate behavior (.008, .008, .05, respectively) from all three children in the Preschool 1 classroom. For Child 1, there was a high background probability of receiving verbal (.55) and facial attention (.51). Child 2 had a high background probability of receiving verbal attention (.68). A comparison of conditional and background probabilities did not indicate positive contingencies between teacher attention and the behavior displayed by these two children. Child 3 had a low background probability of receiving all forms of attention. In addition, for this child, the conditional probability of receiving physical attention given inappropriate behavior (.27) was relatively higher than the background probability of receiving physical attention (.10) suggesting a potential positive contingency between physical attention and inappropriate.

Figure 11 depicts the background probability and conditional probability of the three children in the Preschool 2 classroom receiving different types of attention. There was a high probability of appropriate behavior from all three children in the Preschool 2 classroom (1.0, 1.0, .96, respectively). Child 1 and Child 2 did not engage in inappropriate behavior, and there was a low probability of inappropriate behavior (.05) from Child 3. Child 1 had a high background probability of receiving verbal (.55) and facial attention (.53). Child 2 had a high background probability of receiving verbal attention (.53). Child 3's highest background probability was for receiving verbal attention (.40). For Child 3, the conditional probability of receiving verbal attention and physical attention given inappropriate behavior (.67 and .25, respectively) was

greater than the background probability of receiving verbal attention (.40) and physical attention (.08) suggesting a potential positive contingency. Thus, this child was more likely to receive verbal and physical attention following inappropriate behavior than at any other time.

Figures 12- 14 depict the most probable subtypes of attention received by each of the three children in each of the three classrooms. Figure 12 depicts the probability of each of the children in the Toddler classroom receiving subtypes of attention. Child 1 in the Toddler classroom had a high background probability of receiving attention in the form of neutral statements (.70), instructions (.61), and neutral facial expressions (.69). Child 1 did not receive attention in the form of reprimands or negative facial expressions. For this child, the conditional probability of eye contact given inappropriate behavior (.17) was relatively higher than the background probability of eye contact (.07) suggesting a potential positive contingency between eye contact and inappropriate behavior.

Child 2 in the Toddler classroom had a high background probability of receiving attention in the form of neutral facial expressions (.73). Child 2 was not observed to receive reprimands or negative facial expressions. For this child, a potential positive contingency was observed between materials delivered and inappropriate behavior. That is, the conditional probability of receiving materials given inappropriate behavior (.33) was greater than the background probability of receiving materials (.06). Thus, this child was most likely to be given materials by the teacher following inappropriate behavior than at any other time.

For Child 3, the most probable background forms of attention received were neutral facial expressions (.59), neutral statements (.58), and instructions (.53). Child 3 did not receive reprimands or negative facial expressions. For this child, the conditional probability of prompts and neutral physical attention given inappropriate behavior (.37 and .47, respectively) was

relatively higher than the background probability (.08 and .10, respectively) of these forms of attention suggesting a potential positive contingency.

The probability of each of the children in Preschool 1 classroom receiving each of the subtypes of attention is depicted in Figure 13. For Child 1, the most probable subtype of attention received was neutral statements (.40). Child 1 was not observed to receive neutral physical attention or positive facial expressions. Several potential positive contingencies were observed with this child. The conditional probability of reprimands, prompts, and neutral facial expressions given inappropriate behavior (.5) was relatively higher than the background probability of these forms of attention (.004, .004, .38, respectively) suggesting possible positive contingencies between these forms of attention and inappropriate behavior.

Child 2 in the Preschool 1 classroom was most likely to receive attention in the form of instructions (.48). Child 2 did not receive neutral physical or negative facial attention. For this child, there was a potential positive contingency between praise and inappropriate behavior. That is, the conditional probability of praise given inappropriate behavior (.29) was greater than the background probability of receiving praise (.11). Child 2 was observed to be more likely to receive praise give inappropriate behavior than at any other time.

For Child 3, the probability of receiving attention was low, but the most probable subtype of attention received was positive physical attention (.27). Child 3 was not observed to receive attention in the form of reprimands, neutral physical attention, or negative facial expressions. A potential positive contingency was observed between inappropriate behavior and positive physical attention with this child given the higher conditional probability of receiving positive physical attention following inappropriate behavior (.27) compared to the background probability of receiving positive physical attention (.07).

Figure 14 depicts the subtypes of attention received by the three children in the Preschool 2 classroom. For Child 1, the most probable background subtype of attention received was neutral facial expressions (.48). Child 1 did not receive attention in the form of reprimands, neutral physical, or negative facial expression. For Child 2, the most probable background subtype of attention received was neutral statements (.43). Child 2 did not receive attention in the form of reprimands, prompts, neutral physical, or negative facial expressions. Possible positive contingencies between child behavior and subtypes of teacher attention were not observed with Child 1 or Child 2 in the Preschool 2 classroom.

For Child 3 in the Preschool 2 classroom, the most probable form of attention received was instructions (.25). Child 3 was not observed to receive reprimands, neutral physical attention, or negative facial expressions. For Child 3 in the Preschool 2 classroom, the conditional probability of receiving instructions, neutral statements, and prompts given inappropriate behavior (.50, .25, .25, respectively) was relatively higher than the background probability (.25, .20, .02, respectively) of these events suggesting possible positive contingencies between these types of attention and this child's inappropriate behavior.

Discussion

Descriptive Analysis 3 was designed to evaluate the types of attention delivered to specific children in early childhood education classrooms and to determine potential relationships between child behavior and teacher attention. We found that children in all three early childhood education classrooms engaged in a very high probability of appropriate behavior and a very low probability of inappropriate behavior. The most common form of attention received by the children in all three classrooms was verbal attention. Physical attention was the least likely form of attention received by the children in all three classrooms.

The most probable subtypes of attention received were idiosyncratic across the children. However, instructions, neutral statements, and neutral facial expressions seemed to be prominent subtypes of attention received by the children in all three classrooms. Instructions, neutral statements, and neutral facial expressions were also the most prominent subtypes of attention observed to be delivered by the teachers in Descriptive Analysis 2.

Potential positive contingencies between child behavior and teacher attention were observed in all three classrooms. For Child 2 in the Toddler classroom and Child 3 in the Preschool 1 classroom, a potential positive contingency was identified between inappropriate child behavior and adult physical attention. These results are similar to the results found in Descriptive Analysis 2 in which some of the teachers in the Toddler and Preschool 1 classrooms were observed to have a higher probability of delivering prompts following inappropriate child behavior. It is likely that these potential positive contingencies were identified because the children were likely to be physically prompted to comply with instructions following inappropriate behavior or to be physically placed in time-out following inappropriate behavior.

For Child 2 in the Preschool 1 classroom, a potential positive contingency was identified between inappropriate behavior and praise. For Child 3 in the Preschool 1 classroom, a potential positive contingency was identified between inappropriate behavior and positive physical attention. However, closer inspection of the data suggested that appropriate behavior was observed to occur in the same interval as inappropriate behavior preceding the deliver of these forms of attention in all but one instance for Child 2 and one instance for Child 3. Therefore, it is unclear if there was a positive contingency between these forms of attention and inappropriate behavior. However, the possible positive contingencies between praise and inappropriate behavior and positive physical attention and inappropriate behavior in the Preschool 1 classroom

might indicate that the teachers in this classroom require further training on the appropriate delivery of attention.

For Child 3 in the Toddler classroom, potential positive contingencies were observed between inappropriate child behavior and verbal, facial, and physical teacher attention. For Child 3 in the Preschool 2 classroom, potential positive contingencies were observed between inappropriate child behavior and verbal and facial teacher attention. Therefore, these children were more likely to receive most forms of attention following inappropriate behavior than any other time. However, both children were observed to engage in more appropriate behavior than inappropriate behavior. Perhaps, this is because the probability of receiving noncontingent attention in the classroom was high enough to decrease the children's motivation to engage in inappropriate behavior.

General Discussion

Study 1 provided information about the types and amounts of attention delivered in early childhood education classrooms and potential relationships between child behavior and teacher attention. However, strong possible positive contingencies were not observed between teacher attention and appropriate child behavior. If attention does function as a reinforcer for the behavior of young children, then it might be beneficial for the teachers to deliver more contingent attention to increase desirable child behavior. High levels of noncontingent attention were seen in all three classrooms, and it is possible that the noncontingent attention that the teachers delivered resulted in the low probability of inappropriate behavior and high probability of appropriate behavior that we observed. That is, the high probability of teacher attention might have decreased the children's motivation to engage in attention-maintained inappropriate behavior.

It should be noted that the results of these descriptive analyses are limited in several ways. First, it is unclear whether the results obtained in this study are limited to the unique features of the setting in which the descriptive analyses were conducted or whether similar results would be seen in other early childhood classrooms. It is not known if the behavior-analytic training the teachers received in these classrooms is similar to the training received by teachers in other early childhood settings, and it is likely that the teachers' training influenced the results of the descriptive analyses. For example, it is not clear if the high levels of appropriate behavior and low levels of inappropriate behavior observed in these classrooms is typical of the types and frequency of behaviors seen in other early childhood classrooms or if it was a result of the teacher's training to use both proactive and reactive behavioral strategies to promote appropriate behavior and decrease inappropriate behavior. It is also possible that the high probability of attention delivered by the teachers in this classroom was a result of the training that the teachers received, and might not be representative of all early childhood classrooms. Descriptive analyses should be conducted in a variety of early childhood education classrooms to determine the extent to which the results of these descriptive analyses are representative of the amount and types of child behavior and teacher attention typically seen in early childhood education classrooms.

A second limitation of these descriptive analyses was that the very low probability of inappropriate child behavior limited the determination of potential contingencies between teacher attention and inappropriate child behavior. Past studies have continued observations until a minimum amount of inappropriate child behavior was seen before making conclusions about potential positive contingencies between teacher attention and inappropriate child behavior. For example, McKerchar and Thompson continued observations until they observed problem

behavior in a minimum of 10 intervals. Because we were most interested in types and amounts of teacher attention and appropriate child behavior, we did not continue observations until 10 intervals of inappropriate child behavior was seen. This limits the interpretation of the relationship between teacher attention and inappropriate child behavior in our analyses..

Third, it is possible that the operational definition of several types of teacher attention could have contributed to why we saw extremely high or low probabilities of different types of teacher attention. First, the operational definition of eye contact required that the teacher and child look into one another's eyes. It was often observed that although the teacher was at eye level with the child and looking at the child, the child was looking at the activity or materials and not looking into the teacher's eyes. Thus, our conservative definition of eye contact could be one reason why a low probability of eye contact was observed. In addition, when the teachers were looking at the child but the child was not looking at the teacher, then neutral facial expressions were scored. It is possible that our conservative definition of eye contact and our broader definition of neutral facial expressions resulted in us observing a high probability of neutral facial expressions and a low probability of eye contact. Second, we defined instructions as any statement requiring a response from the child. A more sensitive measure might have been to separate demands (e.g., "Put the toys in the bin.") and conversational questions (e.g., "What did you have for lunch today?"). Including all statements that required a response from the child might be one reason why such high probabilities of instructions were observed. Third, the high probability of neutral statements that we observed could be due to the teachers engaging in conversations with the children. To term this type of attention "neutral" might be somewhat misleading. Our more conservative definition of praise and our broader definition of neutral statements might have resulted in us seeing lower probabilities of praise and higher probabilities

of neutral statements. Future researcher might want to distinguish conversational attention or positive interactions from other forms of neutral attention.

A limitation of all descriptive analyses is that they do not allow for a determination of functional relationships between teacher attention and child behavior. Therefore, the results of our descriptive analyses do not allow us to determine whether attention functions as a reinforcer for the behavior of young children. We conducted Study 2 to determine if attention functioned as a reinforcer for the behavior of 14 of the young children observed in Study 1. Because positive statements, positive facial expressions, and physical attention where all observed to occur in all three classrooms, these types of attention were selected to be evaluated in Study 2.

Study 2: Experimental Analysis of Attention as a Reinforcer

The purpose of Study 2 was to determine the efficacy of attention as a reinforcer and identify the relative influence of different types of attention by conducting a component analysis with 14 young children. A component analysis is a systematic evaluation of the components that make up an intervention package (Cooper et al., 2007). Component analyses are used to determine relative contributions or necessary and sufficient components of intervention packages (e.g., Barnoy, Najdowski, Tarbox, Wilke, & Nollet, 2009; Cooper et al., 1995; Hanley, Iwata, Thompson, & Lindberg, 2000). Therefore, to determine the reinforcing efficacy of attention that includes verbal, physical, and facial attention (types prominently seen in the descriptive analyses), each form of attention was tested as a package and in isolation to determine the relative effects.

Participants and Setting

Participants in Study 2 were 14 typically developing children (age 20 – 44 months) who attended one of the inclusive classrooms observed in Study 1. Table 1 depicts the participant's

name, age, and classroom. Sessions were 5-min in duration. Sessions were conducted in small session rooms adjacent to the Toddler classroom or in a segmented area within the participant's classroom (i.e., in the kitchen area at the table). All sessions started in session rooms; however, sessions were moved to the classroom following low-to-zero levels of responding in the session room for three participants (i.e., Ivy, Edgar, and Carly).

Response Measurement and Interobserver Agreement

During each session, trained observers collected 5-sec partial-interval data using ABC Data Pro™ software on Apple iPods™. Data were collected on the participant's engagement (i.e., manipulating the task materials in the way intended for use) with a reinforcement activity (SR+) and control activity and therapist responses (i.e., delivery of verbal, physical, facial attention or edible items). Therapist verbal attention consisted of neutral statements (e.g., "You are stringing red beads") and positive statements (e.g., "Good job!" "I love the way you are stringing the beads" "We are having so much fun today."). Therapist physical attention consisted of physical contact delivered to the child by the teacher (e.g., tickles, pats on the back, stroking of the child's hair). Therapist facial attention consisted of exaggerated facial expressions in the form of eye contact, smiles, winks, and head nods. Package attention consisted of verbal attention, physical attention, and facial attention being delivered in the same interval. Delivery of edible items consisted of the therapist placing a small edible item in front of the participant.

Interobserver agreement was assessed by having a second observer simultaneously, but independently, record data during a minimum of 33% of sessions for each participant. An agreement coefficient was calculated for child engagement with the SR+ activity, child engagement with the control activity, and therapist responses. Sessions were divided into 5-s intervals. For each interval, an agreement was scored if both observers recorded that the target

event occurred or did not occur. An agreement coefficient was calculated for each event by summing the number of agreements in a given session, dividing by the total number of intervals, and multiplying by 100. Mean interobserver agreement was 98% (range 57-100) for child engagement and 95% (range 76-100) for therapist behavior.

Experimental Design

The reinforcing effectiveness of a given type of attention on levels of activity engagement was evaluated using a concurrent-operants arrangement within sessions and a reversal design or multielement design across sessions. That is, two response options were available within each session. One option was associated with contingent attention, and the other option was associated with no programmed consequences (i.e., extinction). The response option associated with contingent attention was paired with a picture of the therapist. The response option associated with no programmed consequences was paired with a blank white card. The effectiveness of several different types of attention were evaluated across phases.

Procedures

A relatively low-preference activity was selected for use in the study based on the results of a multiple stimulus without replacement (MSWO) or a single stimulus preference assessment conducted prior to the start of the experiment. During the MSWO preference assessment, 5 to 6 activity items (i.e., string beads, ring stacker, coloring pages, tracing pages, block clean up, shape matching, and color matching) were presented to the participant in a simultaneous but random order. The experimenter instructed the participant to select their favorite activity, and the participant was given 30-s access to the selected activity. All other items were removed from the immediate area. When 30 s elapsed, the activity array was re-presented (without the previously chosen item), and the child was asked to select their favorite activity from the remaining options.

The procedure continued until all of the activities had been chosen or until the participant refused to make a selection (DeLeon & Iwata, 1996). During the single stimulus preference assessment, one activity (i.e., string beads, ring stacker, coloring pages, tracing pages, block clean up, shape matching, and color matching) was presented to the participant for 2 consecutive minutes, and 5-s partial- interval data were collected on engagement with the activity (Pace, Ivancic, Edwards, Iwata, & Page, 1985). Engagement was defined as manipulating the activity in the way intended for use. An activity that was ranked low on the MSWO, or an activity with low-moderate engagement during the single stimulus preference assessment, was selected for use during the study.

Following the preference assessment, two identical sets of activity materials were available during each experimental session. One set of materials (SR+) was associated with a given type of contingent attention (described below) and was correlated with a card depicting a picture of the therapist; the other set of materials was associated with no programmed consequences and served as the control activity within a given session. The control activity was correlated with a blank, white card. Data were collected on the participant's engagement with the target and control tasks and therapist responses.

Given the young age of the participants, the experimenter and a prompt therapist provided pre-session exposure to the contingencies associated with each set of the materials before each session. Prior to the session, a prompt therapist would enter the research area and verbally prompt the participant to engage with both the target and control task three times each. If the participant did not follow the verbal instruction, then the prompt therapist modeled how to engage with the activity. If the participant did not engage with the activity following the model prompt, then the prompt therapist physically guided the participant to engage with the activity.

When the participant engaged with the SR+ activity, the therapist delivered the relevant consequence. No consequences were provided for engaging with the control activity. For one participant (Carly), 30-s prompts were delivered as reminders that she could engage with the materials.

During sessions conducted in small rooms adjacent from the Toddler classroom, both the participant and the therapist sat on the floor. During sessions conducted in the participant's classroom, both the participant and therapist sat at a table in the kitchen area of the room. The materials were placed directly in front of the child. The pictures depicting the SR+ activity and control activity were placed behind the relevant activity. The therapist sat on the side with the SR+ activity. The participant was free to move around during session, and the therapist positioned herself in a way that allowed for attention delivery. During each session, if the participant engaged in the SR+ activity, the therapist delivered attention. If the participant stopped engaging with the task or engaged with the control activity, then attention delivery was terminated. Engagement with the control activity resulted in no programmed consequences. If attention was not shown to be a reinforcer, edibles were delivered to determine whether the behavior was sensitive to operant contingencies. Highly preferred edible items were chosen based on the results of an MSWO preference assessment (DeLeon & Iwata, 1996).

Baseline. During the baseline condition, engagement with the task materials did not result in any programmed consequence.

Verbal. During the verbal attention condition, engagement with the SR+ activity resulted in brief positive statements (e.g., "That looks like so much fun!" or "Wow, nice job!") delivered by the therapist. Verbal attention was delivered continuously until the participant stopped engaging with the target task or engaged with the control task. No physical attention or eye

contact was provided.

Physical. During the physical attention condition, engagement with the SR+ activity resulted in physical contact (e.g., back rub, tickles, hugs). Physical attention was delivered continuously until the participant stopped engaging with the target task or engaged with the control task. No verbal attention, positive facial expressions/eye contact was provided.

Facial expression. During the facial expression condition, engagement with the SR+ activity resulted in positive facial expressions (e.g., smile, nod, wink, eye contact) from the therapist. Facial attention was delivered continuously until the participant stopped engaging with the target task or engaged with the control task. The therapist kept her head down in a manner that did not allow the child to see her face (e.g., hands or hair shielding face). When the participant engaged with the SR+ activity, the therapist's face appeared; the therapist made sure she was at eye level with the child and that all facial expressions were exaggerated. This was done in an attempt to ensure that the stimulus change in the therapist's behavior following the child's engagement with the SR+ activity was salient. No verbal or physical attention was provided.

Package. During the package condition, engagement with the SR+ activity resulted in positive statements, physical attention, and positive facial expressions/eye contact. Package attention was delivered continuously until the participant stopped engaging with the target task or engaged with the control task

Edible. During the edible condition, engagement with the SR+ activity resulted in delivery of a preferred edible item from the therapist on an FR1 schedule. No verbal, physical, or facial attention was provided. All participants for whom an edible condition was implemented engaged in an activity with a discrete response (e.g., string beads, ring stack, or clean up blocks).

Package plus edibles. During the package plus edibles condition, engagement with the SR+ activity resulted in positive statements, physical attention, positive facial expressions, and the delivery of an edible item from the therapist.

Results

The purpose of Study 2 was to determine the efficacy of attention as a reinforcer and identify the relative influence of different types of attention. Figures 15-28 depict the results from Study 2. For Beth (Figure 15) each type of attention functioned as a reinforcer. During baseline, Beth demonstrated undifferentiated responding. When package attention, verbal attention, physical attention, or facial attention was delivered contingent upon target responding, Beth displayed high levels of responding to the target task and low levels of responding to the control task suggesting that package attention and each of the types of attention functioned reinforcers.

Figures 16-18 depict data for Eddie, Bev, and Carol, participants for whom package attention and verbal attention functioned as reinforcers. For these participants, high levels of responding to the target task were observed during the package attention condition and the verbal attention condition as compared to low or undifferentiated levels of responding to the control task and in baseline. Low or undifferentiated levels of responding to the target task were observed in the physical and facial attention conditions compared to the control task and baseline. These results suggest that both package attention and verbal attention functioned as a reinforcer for the behavior of these individuals.

Larry (Figure 19) was also a participant for whom package attention and verbal attention appeared to be reinforcers. For Larry, higher levels of responding to the target task were observed during the package condition. Following the package condition, Larry did not respond

to receive verbal attention and responded at a very low rate to the target task, as compared to the control task, when physical attention was delivered. However, these results were not replicated. During a second introduction of physical attention, Larry responded to the target task once during the physical condition. During a return to the verbal attention condition, Larry responded more to the target task than the control task and these results were replicated after a return to baseline. Facial attention initially functioned as a reinforcer for responding and these results were replicated after a return to baseline, but these results did not maintain during a third introduction of facial expressions. Because the results of Larry's reinforcer assessment were unclear using a reversal design, all forms of attention were tested using a multielement arrangement. When all three forms of attention and the control task were presented in a concurrent operants arrangement within a multielement design, Larry responded more for verbal attention compared to the control task. Larry did not respond more for facial or physical attention when compared to the control task. Thus for Larry, verbal attention was the only component that maintained responding.

Figure 20 depicts Michelle's responding. Michelle responded more to the target task than the control task during the package, physical, and facial attention conditions. Michelle responded only once during the verbal attention condition. These results suggest that package, physical and facial attention functioned as a reinforcer for Michelle's behavior, but verbal attention did not.

Figures 21 – 24 depict data for Grant, Matt, Jackie, and Eva, participants for whom package attention initially functioned as a reinforcer, but the results were not maintained over time. For these participants, higher levels of responding to the target task, compared to the control task, were initially observed but the results were not maintained or replicated. For Grant (Figure 18), verbal attention also initially functioned as a reinforcer, but the results were not maintained over time.

Figures 25-27 depict data for Ivy, Edgar, and Carly, participants for whom responding to the target and control task did not occur in the session room. Subsequent sessions were then conducted with the participants in their classroom.

Ivy's responding is depicted in Figure 25. For ease of visual inspection, mean lines were added depicting Ivy's responding to the target task. Ivy was a participant for whom little to no responding was seen toward the target or control task during baseline, package attention, or edible conditions when sessions were conducted in a session room. Therefore, the reinforcing value of attention for Ivy's behavior was assessed in the classroom. When sessions were conducted in Ivy's classroom, high levels of responding for package, verbal, and physical attention was observed suggesting that these forms of attention functioned as a reinforcer for her behavior. Ivy responded more to the target task than the control task during the facial condition; however, levels of responding to the target task during the facial condition were lower than or the same as responding during baseline. Therefore, we determined that facial attention did not function as a reinforcer for Ivy's behavior.

Data for Edgar are depicted in Figure 26. Edgar initially responded for package attention in the session room, but this effect quickly extinguished. Therefore, sessions were conducted with Edgar in his classroom. Once in the classroom, Edgar's responding increased but target and control responding were undifferentiated during the package condition. Therefore, an edible condition was introduced. During the edible condition, Edgar responded more to the target task than the control task. Following the edible condition, package attention was reintroduced. Edgar responded more toward the target task than the control task during this phase. Therefore, the baseline condition was reintroduced in which undifferentiated responding was observed. Following baseline, the package condition was reintroduced and upon the return to the package

condition, high levels of responding to the target task and low levels of responding to the control task were initially observed, but this effect quickly extinguished. Following low levels of responding during the package attention condition, an edible condition was reintroduced. High levels of responding to the target task and low levels of responding to the control task were observed during this condition. Following the edible condition, package attention was reintroduced and little to no responding was observed. Next, a package attention plus edibles condition was implemented and high levels of responding to the target task and low levels of responding to the control task were observed. Finally, the package attention was reintroduced and little to no responding to the target task was observed. These results suggest that package attention alone did not maintain Edgar's responding, but the introduction of edible reinforcers did maintain responding.

Figures 27 and 28 depict responding got Carly and June, participants for whom attention was not shown to function as a reinforcer. Carly's responding is depicted in Figure 27. For Carly, responding to the control task was initially observed during the baseline and package condition and little to know responding was observed to the target task. Therefore, a contingency reversal was conducted in which responding to the task associated with the white card would result in attention and responding to the task associate with a picture of the therapist would not result in any programmed consequences; low to zero levels of responding were observed during the contingency reversal. Next, the package condition was reintroduced and no responding was observed. Following the package condition, a negative reinforcement condition was implemented in which responding to the target task resulted in termination of attention; zero levels of responding were observed in this condition. A package condition and an edible condition were then introduced and low to zero levels of responding were observed. Therefore, Carly was

moved to her classroom for sessions. During the initial baseline, package, and edible conditions in the classroom no responding was observed. Therefore, a prompt was added in which the therapist reminded Carly every 30s that she could play with the materials if she wanted. Following prompts, undifferentiated responding was observed during the baseline and package conditions. Therefore, a prompt plus edibles condition was implemented; higher levels of responding were observed to the target task in comparison to the control task during this condition. When a package plus prompt condition was reintroduced low undifferentiated levels of responding were observed. Therefore, a prompt plus edibles plus package attention condition was implemented; low undifferentiated levels of responding were observed during this condition. Following this condition, an edible plus prompt phase was reintroduced and higher levels of responding to the target task in comparison to the control task were observed. The package plus prompt plus edible condition was reintroduced following this phase and higher levels of responding to the target task in comparison to the control task were observed. A return to baseline plus prompt and package plus prompt produced low undifferentiated responding. However, when package plus edibles plus prompt was reintroduced, higher levels of responding were observed to the target task in comparison to the control task. Ending with a return to package plus prompt resulted in low, undifferentiated responding. Thus, edibles were needed to produce a reinforcement effect with this participant, and attention alone did not function as a reinforcer.

Figure 28 depicts responding for June. For June, low to zero levels of responding to the target and control task were observed during the package condition. In an attempt to ensure that task engagement was sensitive to reinforcement contingencies, an edible condition was introduced. During the edible condition, high levels of responding to the target task and low

levels of responding to the control task were observed. When the package condition was reintroduced, near-zero levels of responding to the target and control task were observed.

Discussion

Table 2 depicts a summary of the results from Study 2. Study 2 attempted to determine the efficacy of attention as a reinforcer and identify the relative influence of different types of attention with 14 young children. The experimental analysis conducted in Study 2 showed that (a) attention does serve as a reinforcer for the behavior of some young children, (b) the behavior of some young children is differentially sensitive to different types of attention (e.g., verbal, facial, physical), (c) the effects of attention might not maintain over time for increasing the behavior of all young children, and (d) attention alone might not be an effective reinforcer for increasing the behavior of some young children and other strategies, such as the use of edible items or prompts, might need to be used to increase behavior. Study 2 provides further evidence for the complex nature of attention and demonstrates that attention is likely to have idiosyncratic effects when trying to increase the behavior of young children.

The results of Study 2 suggest that contingent attention (consisting of verbal attention, physical attention, and positive facial expressions) served as a reinforcer for task engagement for 79% of the 14 participants. However, the effect did not maintain over time for 29% of them. No reinforcement effect was observed for 21% of the participants. Results of the component analyses were idiosyncratic across 7 of the 12 participants with whom it was conducted. Half of the participants responded to receive verbal attention and 25% responded to receive physical and 17% responded to receive facial attention.

For three participants, sessions had to be conducted in the classroom before responding would consistently occur. Therefore, it is possible that attention might be more or less valuable

in different settings. It is also possible that for some young participants, analog or novel settings might not be appropriate for evaluating reinforcer effectiveness. Morris (1980) noted that the effects of conditioned reinforcers (e.g., attention) have been most variable under laboratory conditions for some subjects. Thus, conducting experimental studies in the natural environment (e.g., in the classroom) might need to occur to lead to a better understanding of the relationship between attention and the behavior of some young children.

For three participants, edibles were required to produce responding to the target task and for one participant prompts were required. It is possible that the behavior of these participants was not sensitive to any type of attention, or it is possible that some types of attention that were not test or combinations of types of attention that were not tested could have functioned as reinforcers for the behavior of these young children. All three children, for whom attention was not shown to function as a reinforcer, were young children from the Toddler classroom. It is possible that these children did not have a sufficient conditioning history to establish attention as a reinforcer. To establish attention as a reinforcer for the behavior of these young children, attention might need to be paired with primary reinforcers. Future researchers should evaluate methods for conditioning attention as a reinfocer (Dozier, Iwata, Thomason-Sassi, & Wilson, 2012). It would be beneficial for the behavior of young children to be sensitive to attention as a reinforcer because teachers in early childhood classrooms are likely to receive training on delivering attention as a reinforcer and attention is much easier for teachers to deliver than other potential reinforcers like edible or tangible items. In addition, if attention is a conditioned reinforce, then it is possible that attention loses its reinforcing potency when the primary reinforcers it has been paired with are no longer present. Therefore, future research should evaluate the reinforcing efficacy of attention in the presence and absence of primary reinforcers.

Several limitations of Study 2 are worth noting. First, the classrooms and participants in this study might not be representative of all early childhood education programs, especially given that the teachers in these classrooms received a good deal of behavior analytic training and were, therefore, instructed to deliver relatively high levels of attention to the children throughout the day. In fact, it is possible that the high levels of attention received by the children that participated in Study 2 throughout the day could have served as an abolishing operation, thereby, decreasing the effectiveness of attention during the experimental session for some of the participants. In addition, the component analysis conducted in Study 2 only included three different types of attention (verbal, facial, physical). It is possible that subtypes of those types of attention (e.g., descriptive praise, general praise, negative facial expressions, gestures, prompts, restraint) could also produce differential effects on the behavior of young children in early childhood education classrooms. In addition, in Study 1 and Study 2 we did not address potentially influential parameters of attention such as the tone of voice used when delivering verbal attention. For example, a statement such as "You better not do that" could be interpreted as a firm statement of disapproval or a playful temptation to engage in a task depending on the tone of voice in which it is delivered. It is possible that the tone of voice that teachers use when delivering attention could influence the effectiveness of attention as a reinforcer.

A number of areas warrant further investigation, first researchers might determine the extent to which the findings from our more analog setting generalize not only to the actual classroom environment but also to other types of child behavior. Second, in addition to examining other specific forms of attention not included in the current study, researchers might evaluate other parameters of reinforcement that might differentially influence the effectiveness of a given form of attention. Finally, given the ubiquitous nature of attention and its presumably

crucial role in child development, future research should focus on developing procedures to condition attention as a reinforcer for children whose behavior appears insensitive. Further investigations in these areas are needed to provide a clearer understanding regarding the features of attention that contribute to its effectiveness in the acquisition and maintenance of important behaviors for young children.

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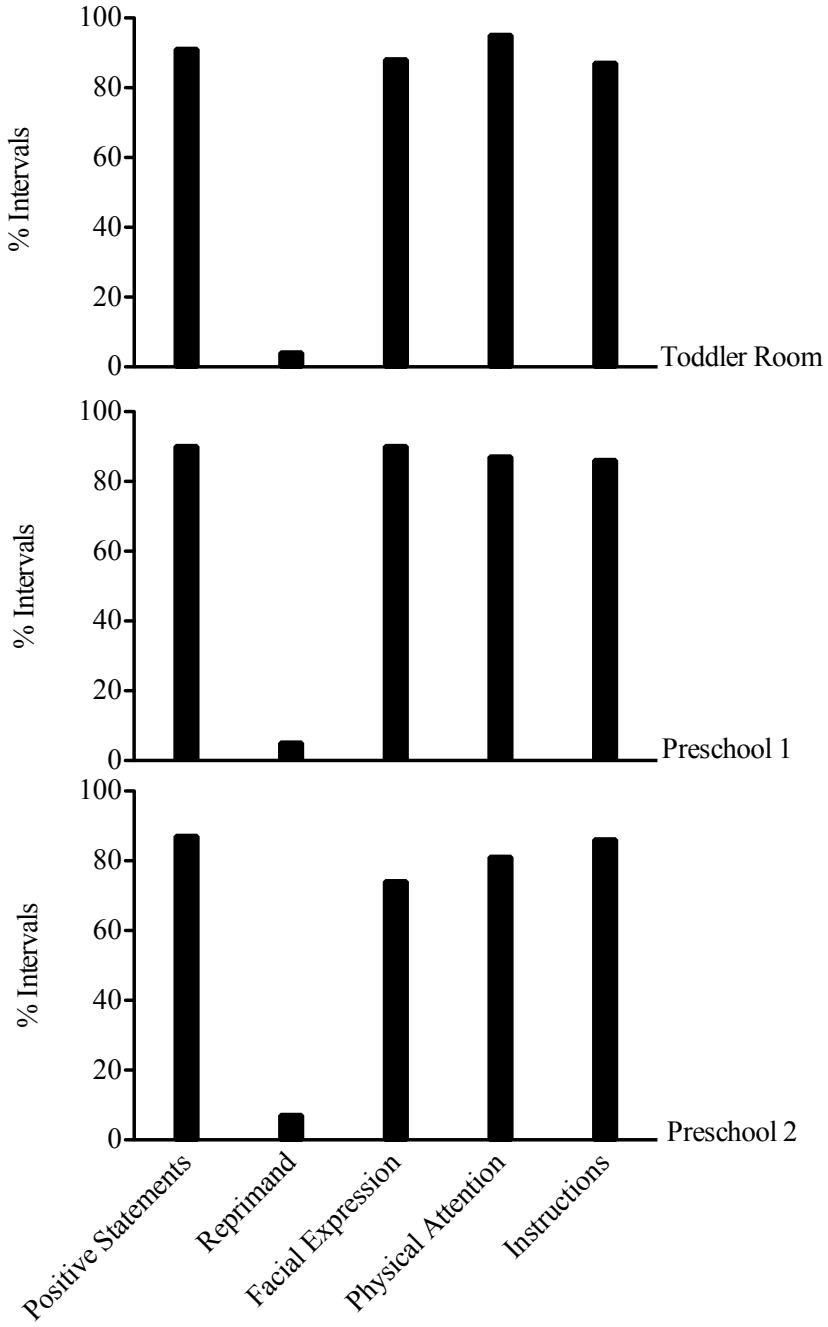

Figure 1. Percentage of 2-min intervals in which different types of attention were observed in three early education classrooms.

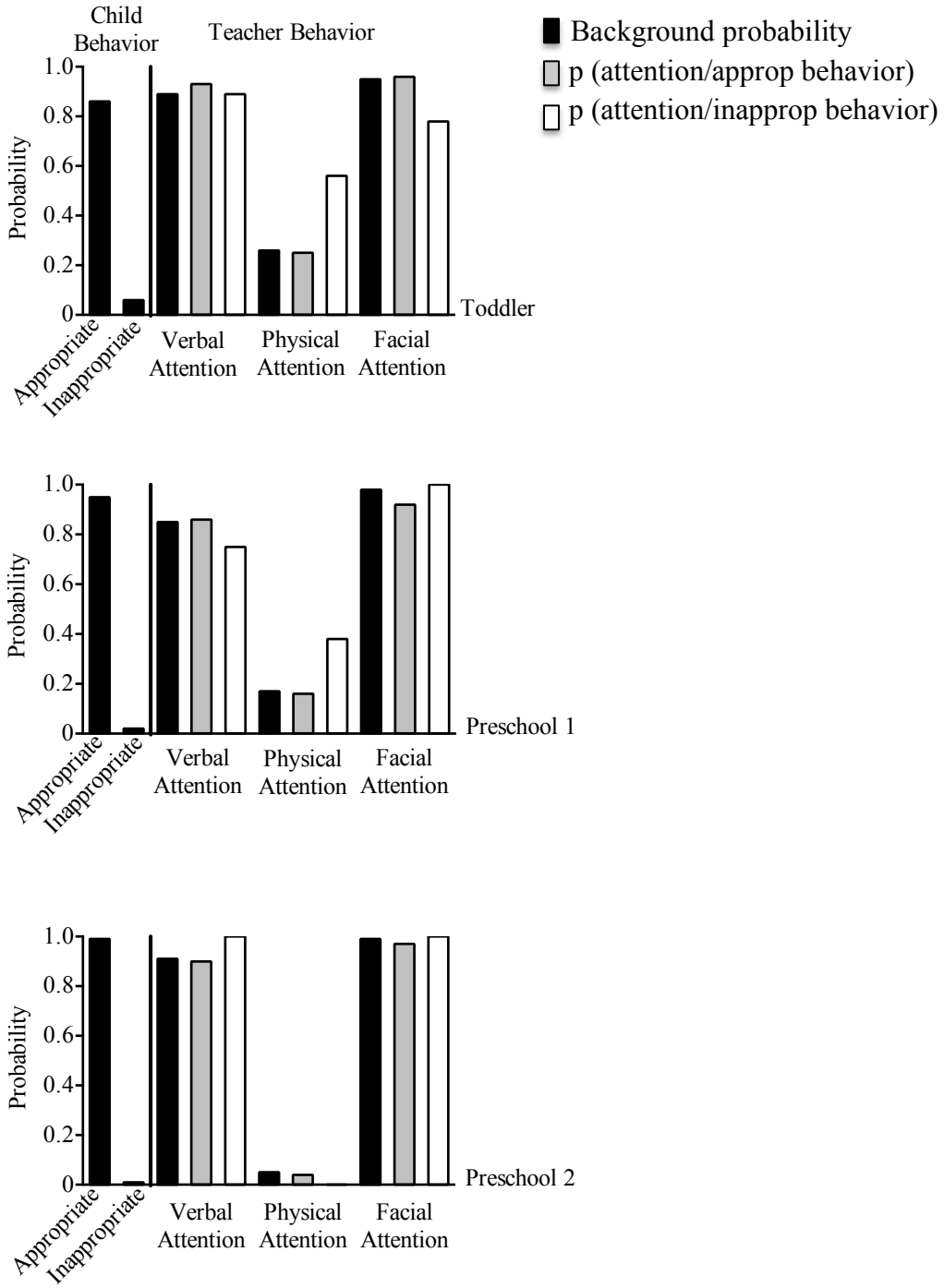

Figure 2. Analysis of types of attention across all teachers within each of the three early childhood education classrooms.

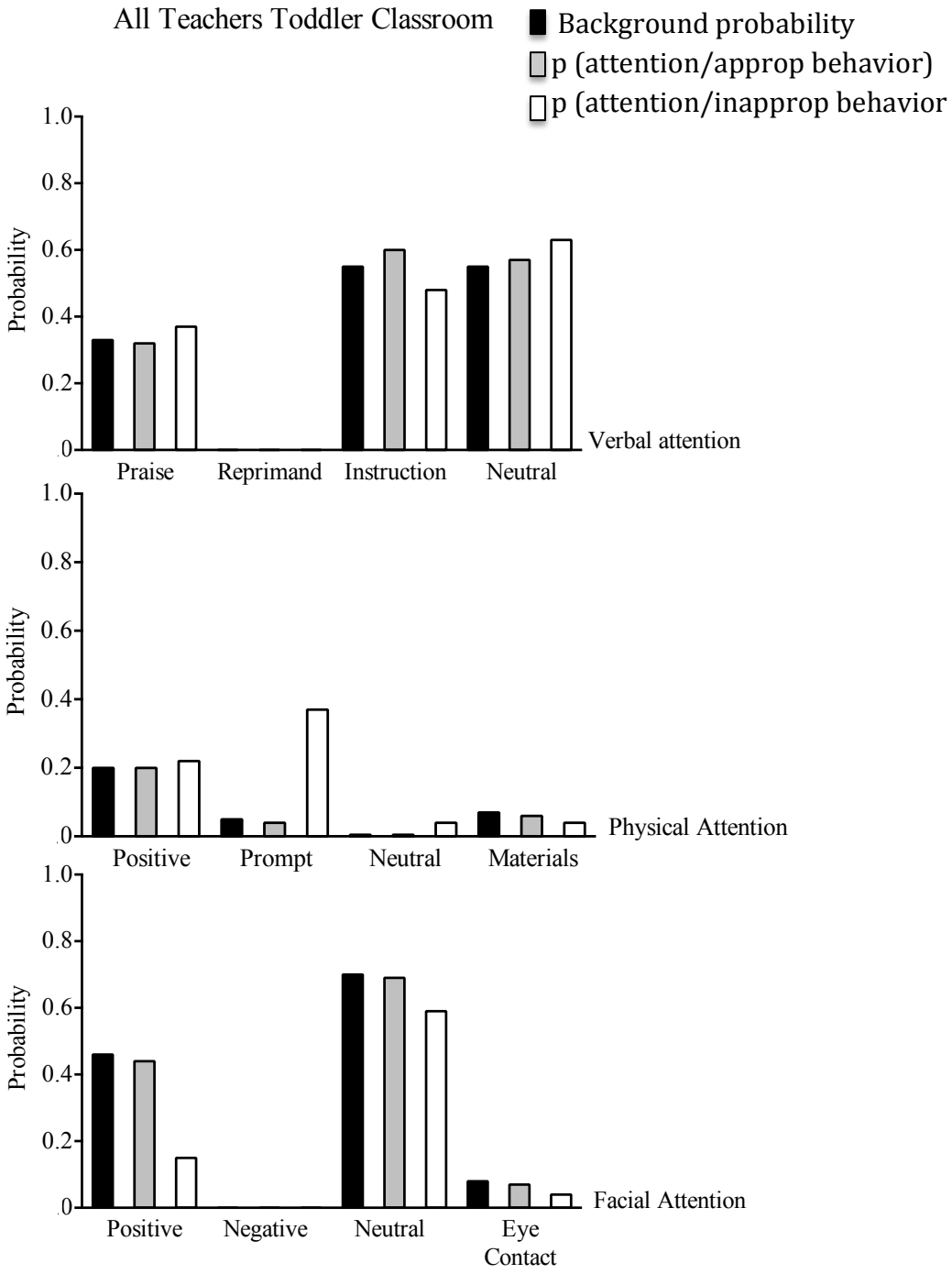

Figure 3. Analysis of attention subtypes across all three teachers in the Toddler classroom within each of the three attention subtypes.

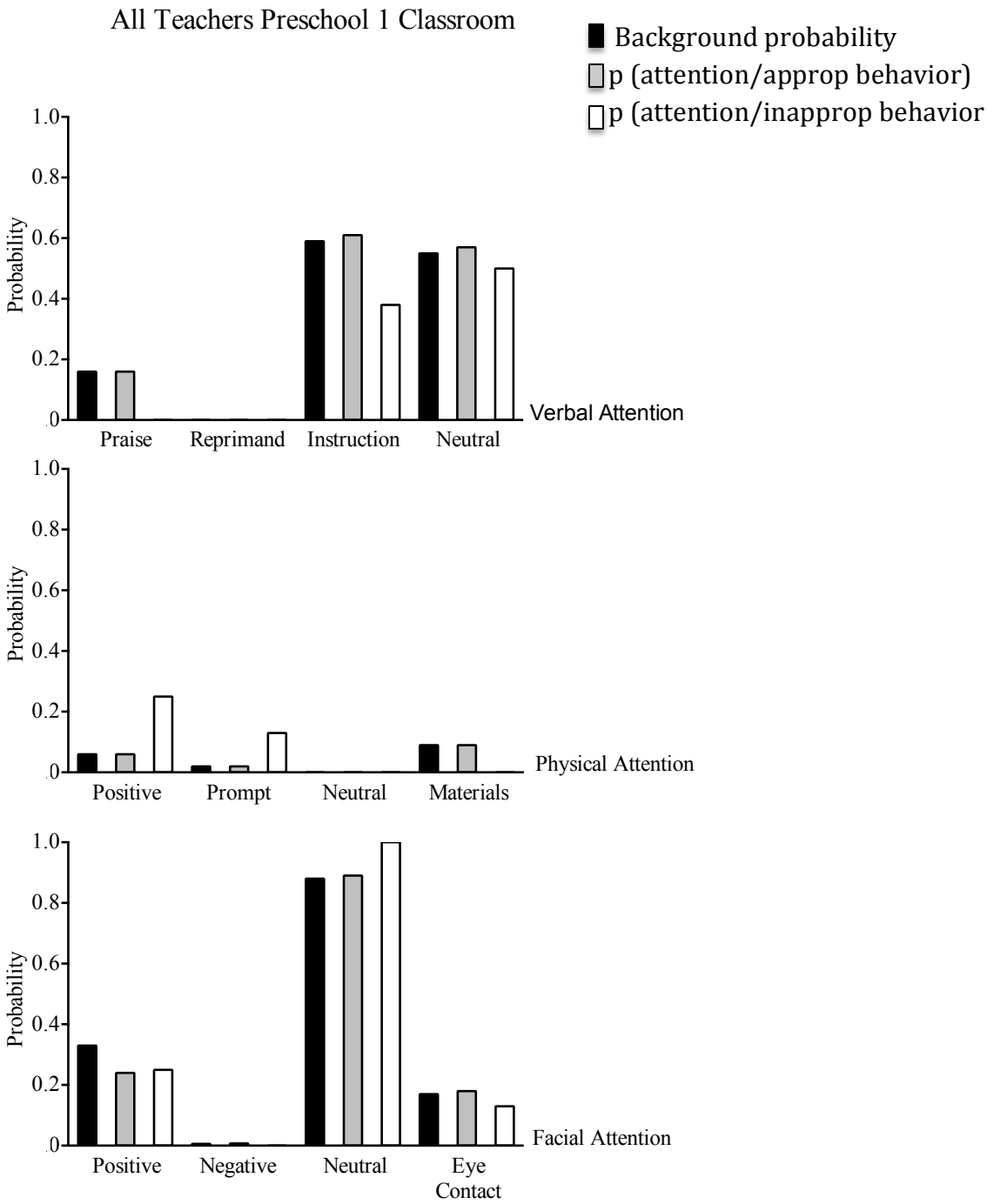

Figure 4. Analysis of attention subtypes across all three teachers in the Preschool1 classroom within each of the three attention subtypes.

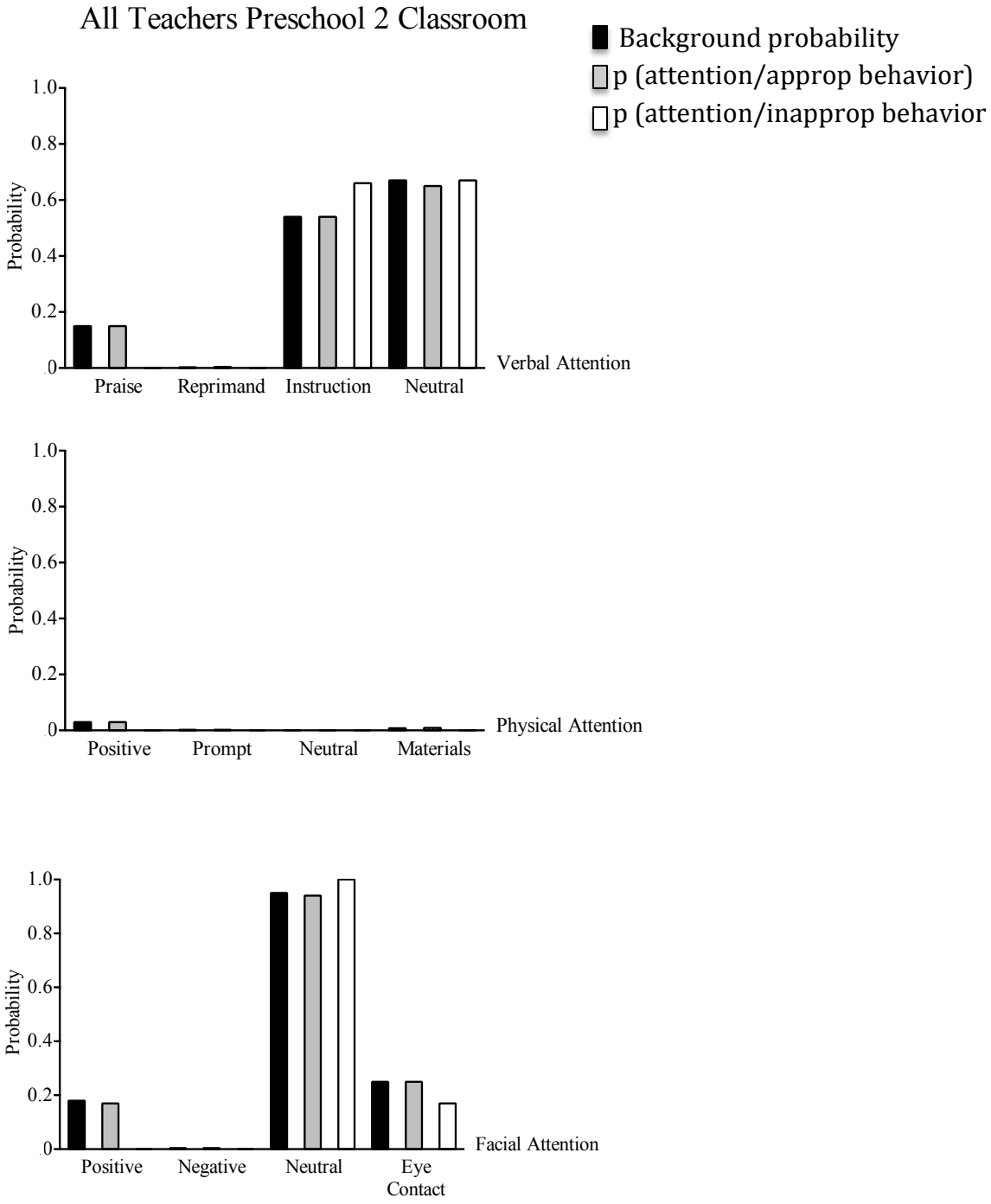

Figure 5. Analysis of attention subtypes across all three teachers in the Preschool 2 classroom within each of the three attention subtypes.

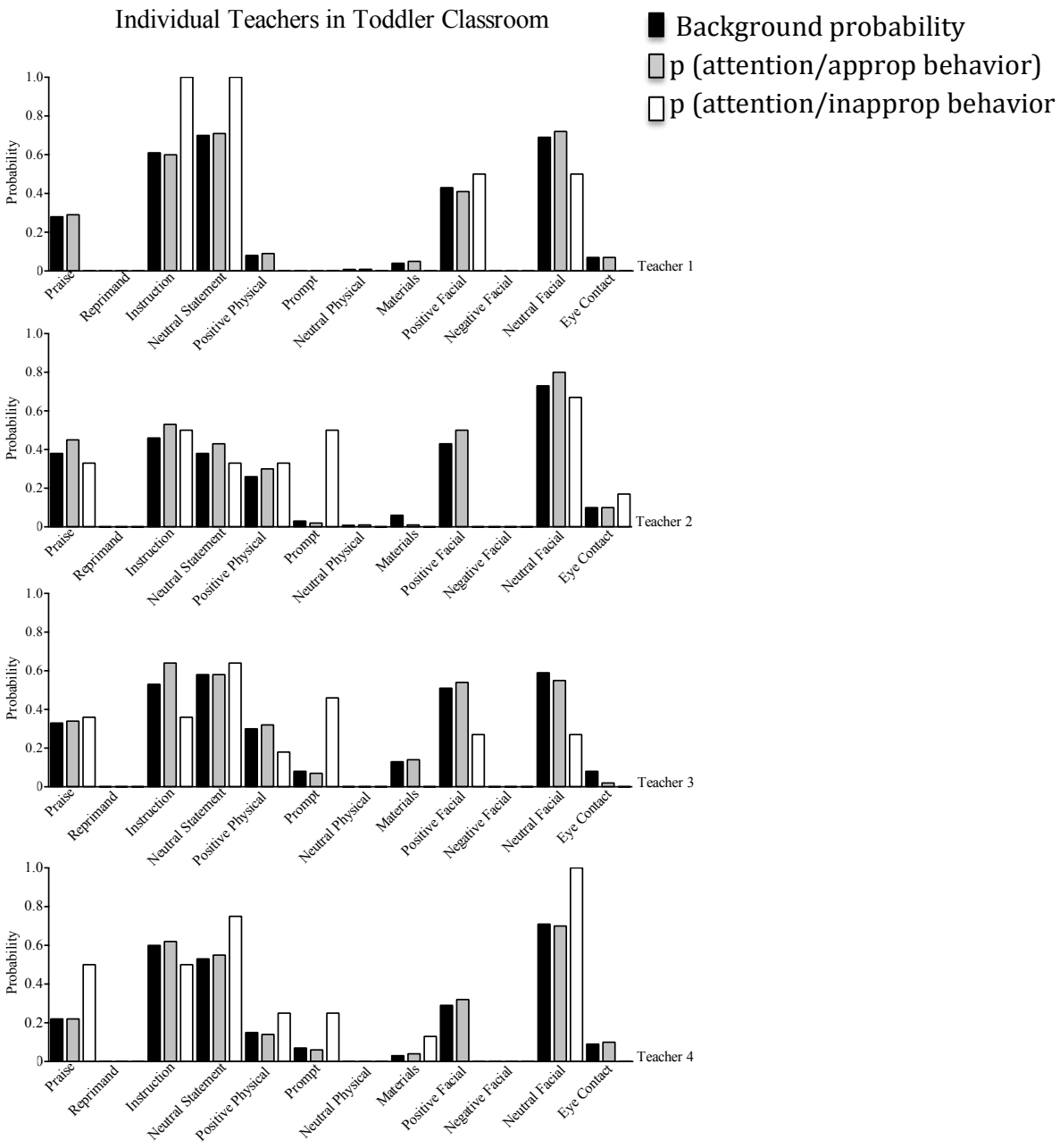

Figure 6. Analysis of individual teacher's delivery of each subtype of attention in the Toddler classroom.

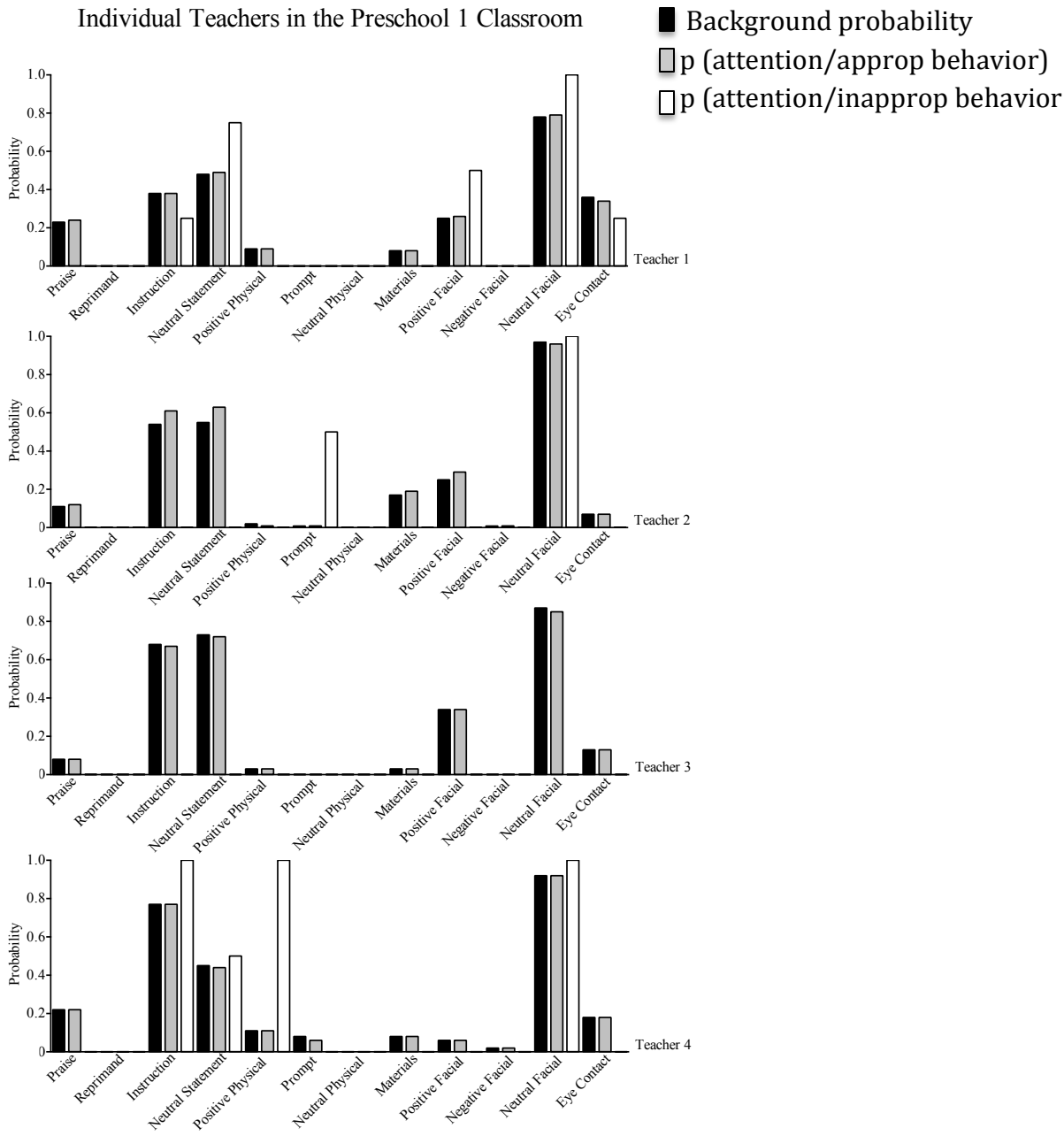

Figure 7. Analysis of individual teacher's delivery of each subtype of attention in the Preschool 1 classroom.

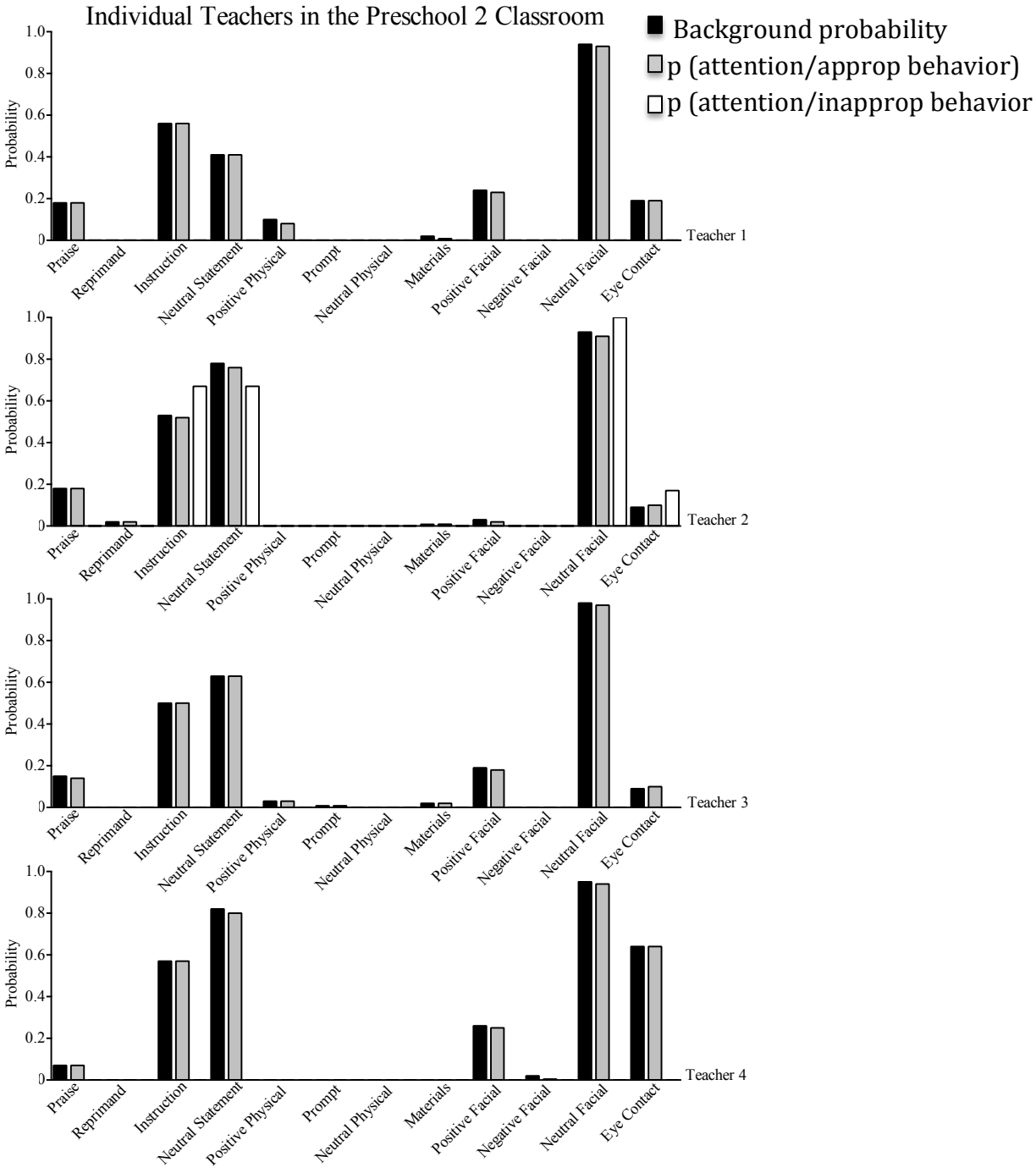

Figure 8. Analysis of individual teacher's delivery of each subtype of attention in the Preschool 2 classroom.

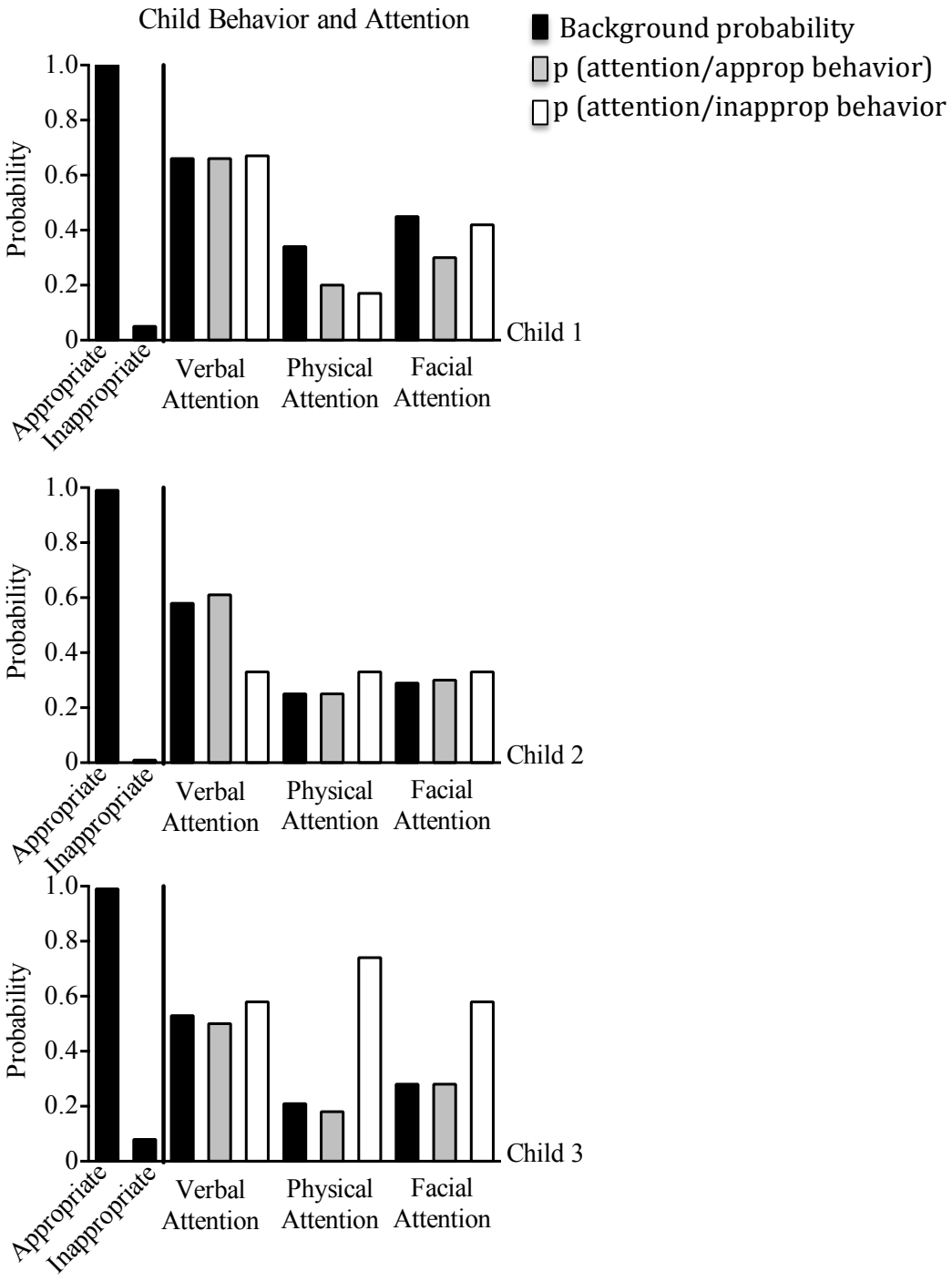

Figure 9. Analysis of types of attention following appropriate and inappropriate responding by three children in the Toddler classroom.

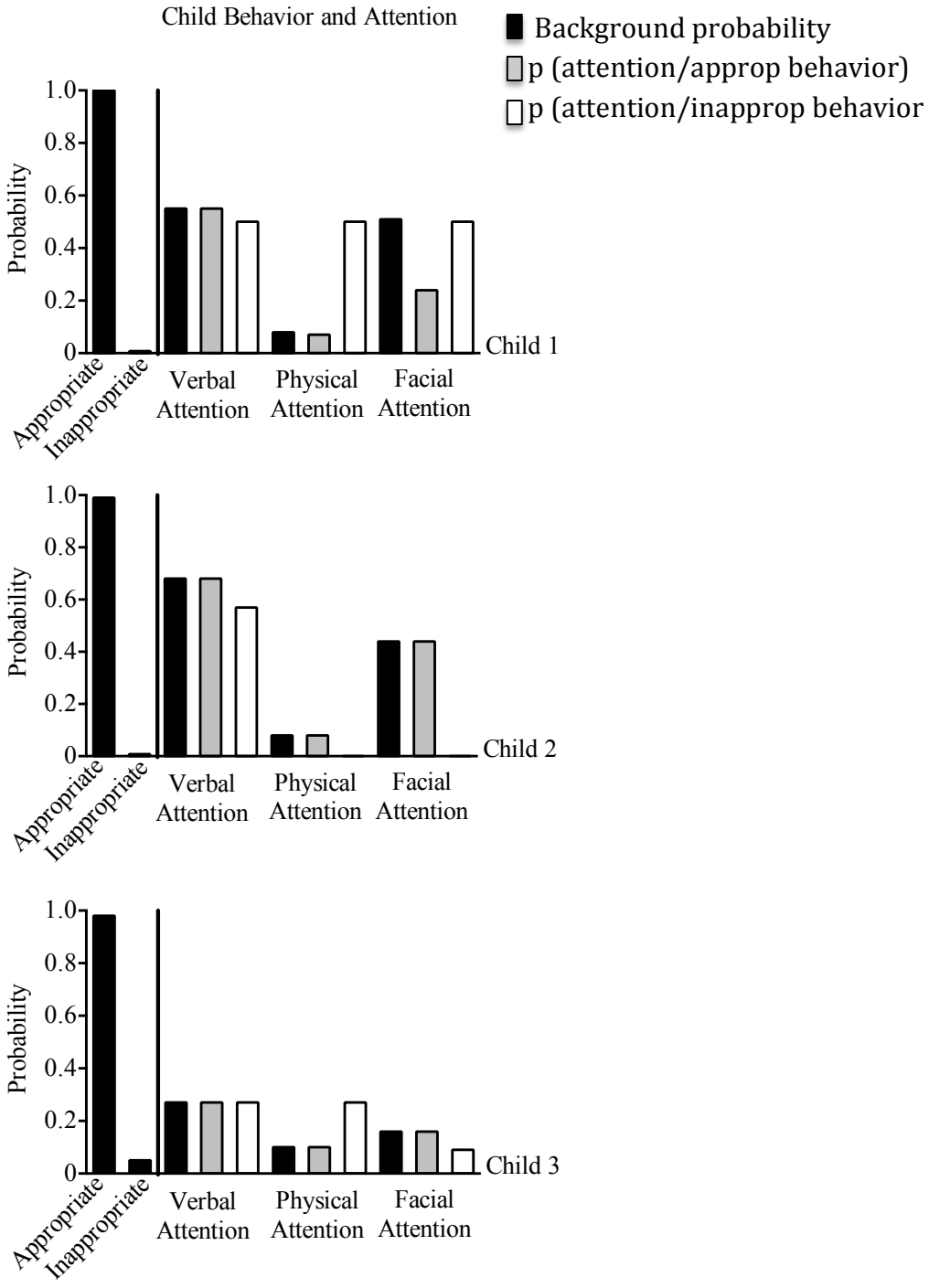

Figure 10. Analysis of types of attention following appropriate and inappropriate responding by three children in the Preschool 1 classroom.

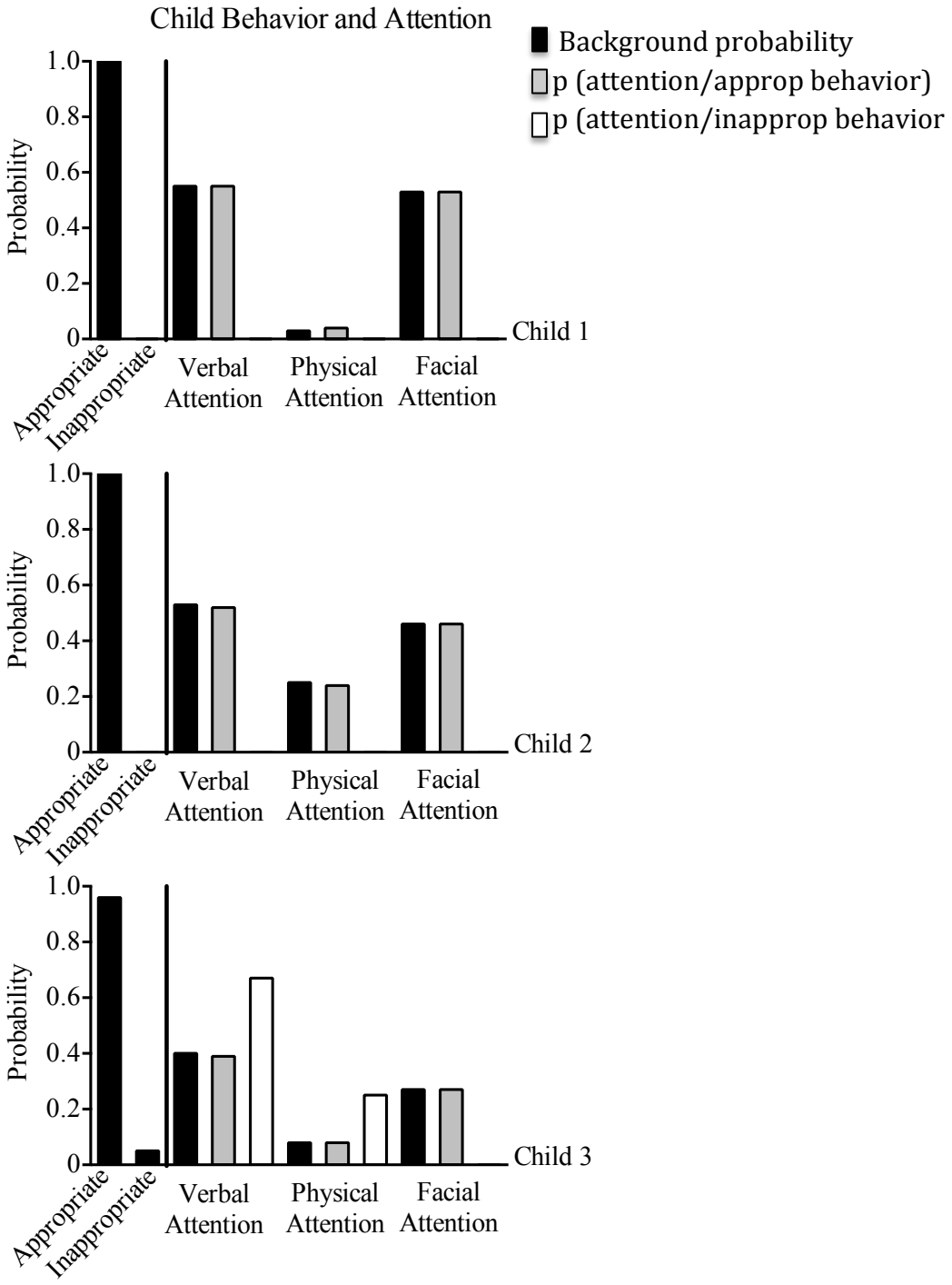

Figure 11. Analysis of types of attention following appropriate and inappropriate responding by three children in the Preschool 2 classroom.

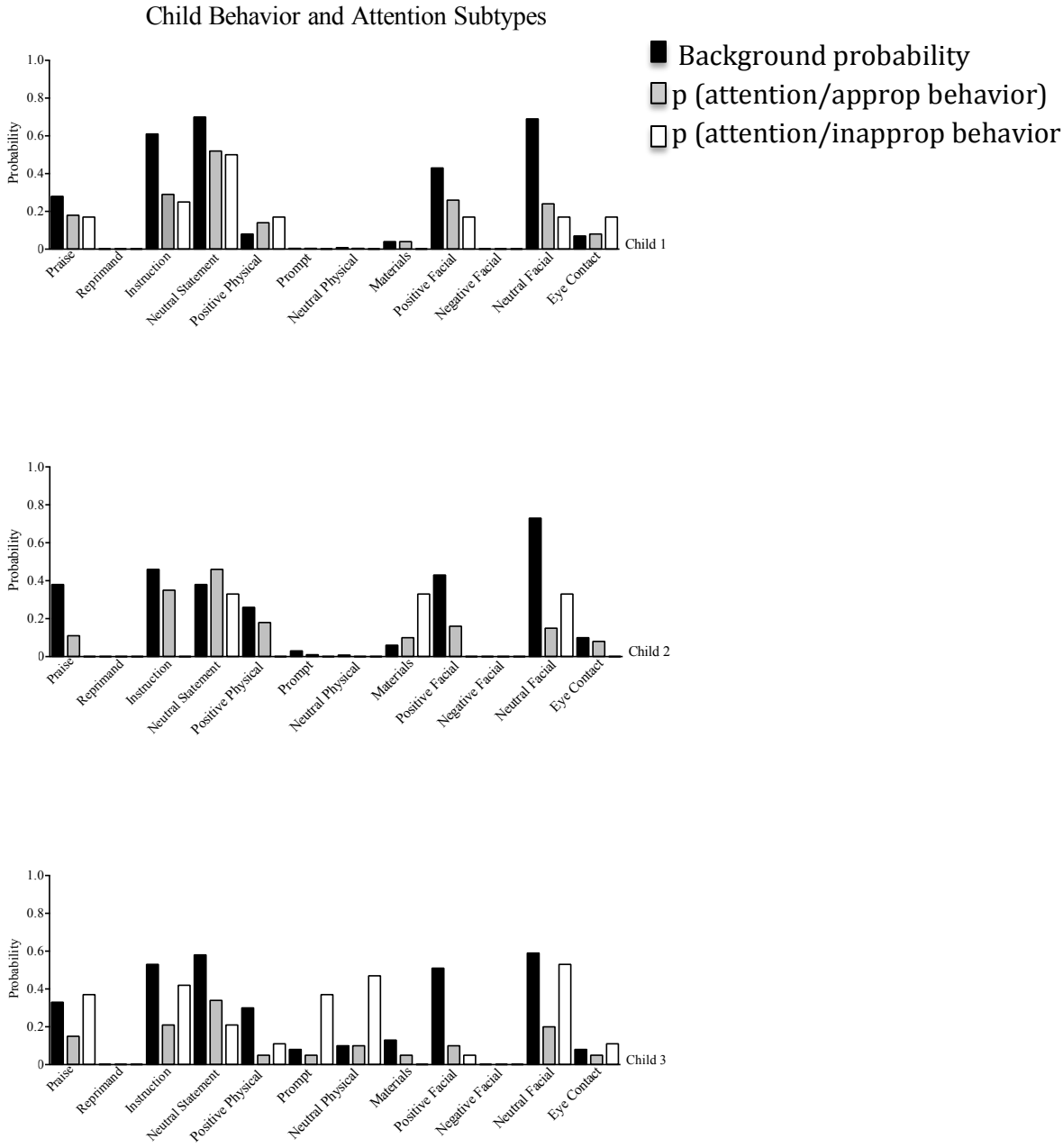

Figure 12. Analysis of attention subtypes surrounding appropriate and inappropriate responding by three children in the Toddler classroom.

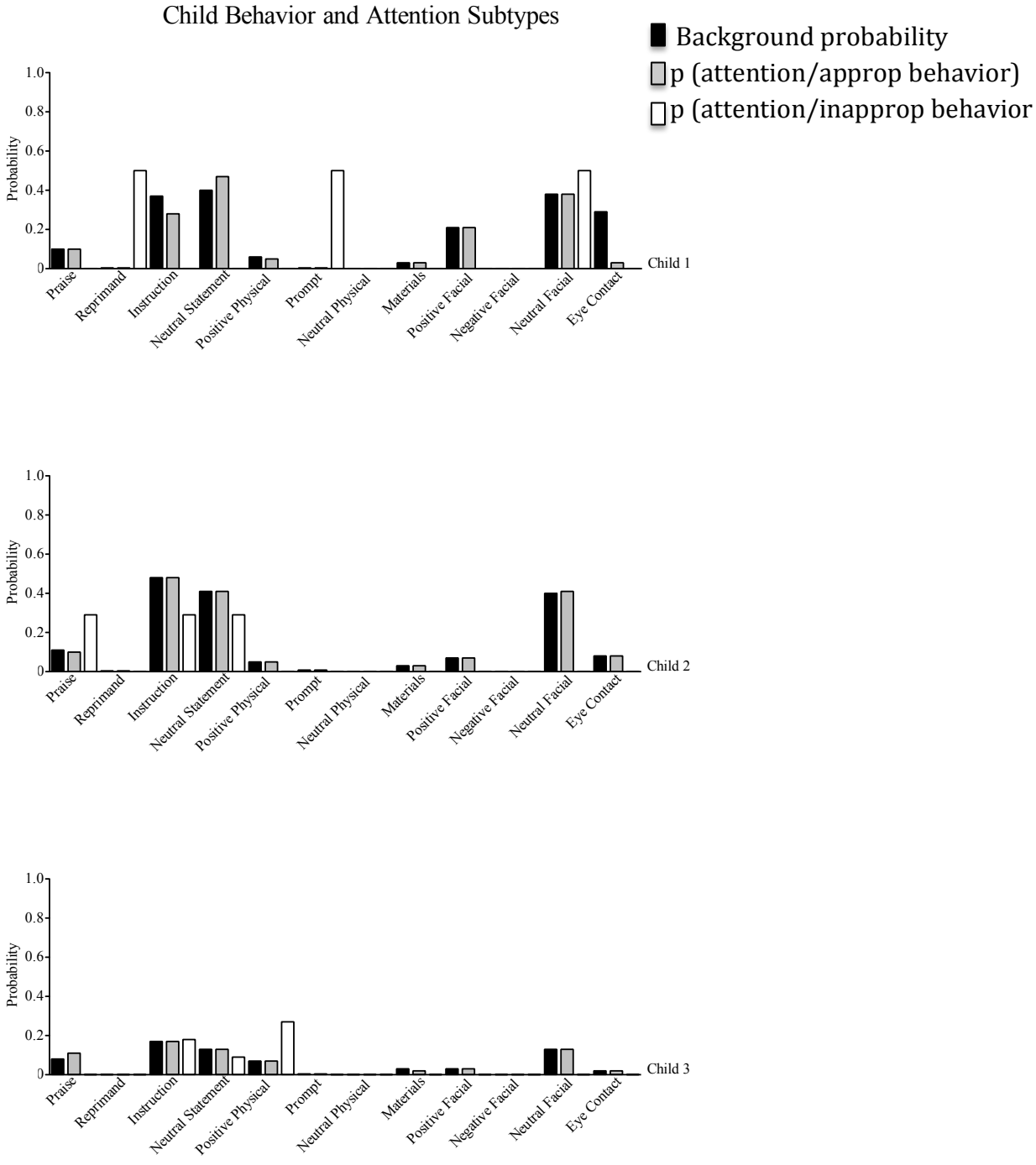

Figure 13. Analysis of attention subtypes surrounding appropriate and inappropriate responding by three children in the Preschool 1 classroom.

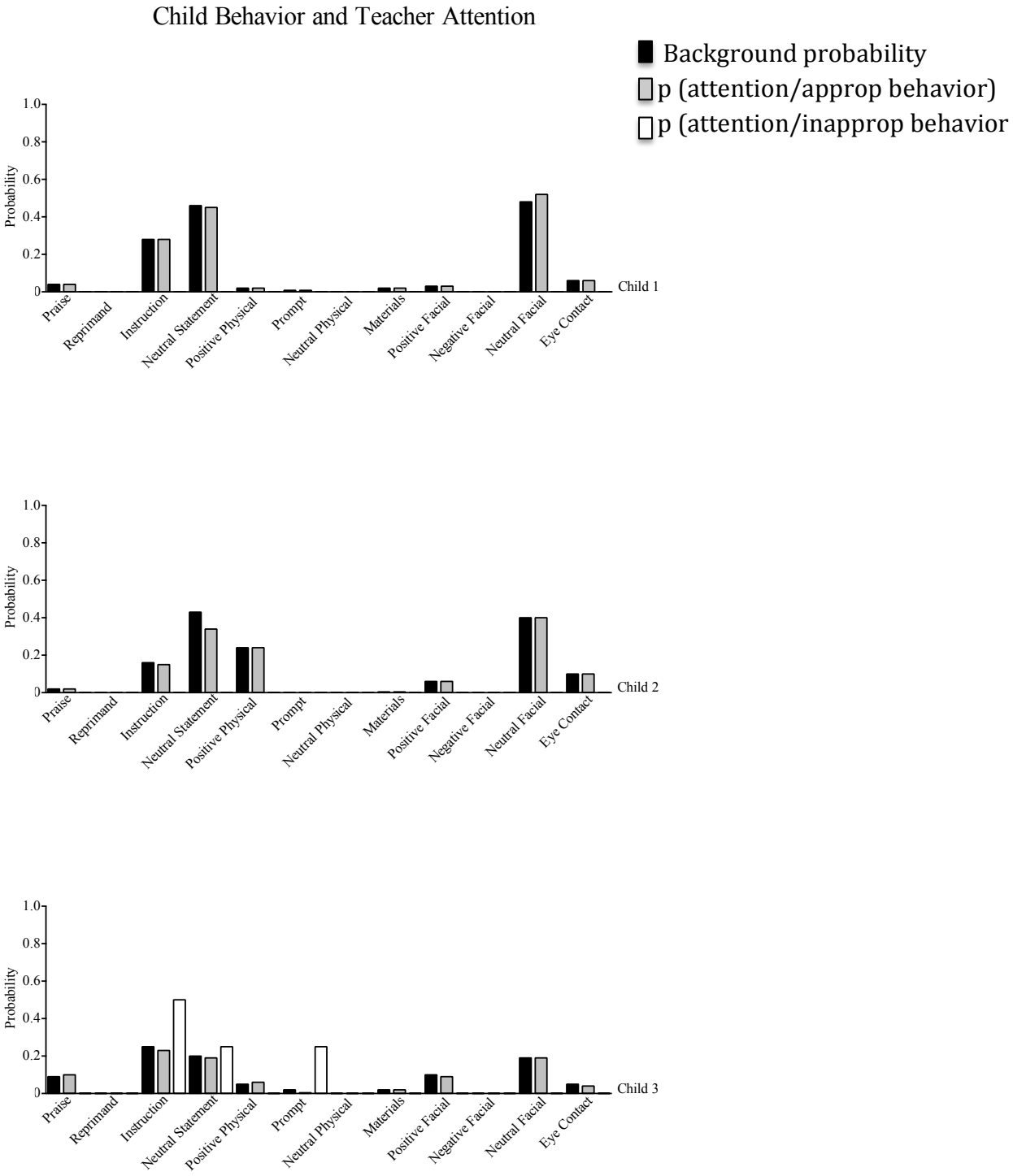

Figure 14. Analysis of attention subtypes surrounding appropriate and inappropriate responding by three children in the Preschool 2 classroom.

Table 1

Participant names, ages (in months), and classroom at Study 2 commencement.

Name	Age	Classroom
Beth	27	Toddler
Bev	39	Preschool 1
Carol	20	Toddler
Carly	32	Preschool 1
Eddie	27	Toddler
Edgar	44	Preschool 2
Eva	30	Toddler
Grant	25	Toddler
Ivy	25	Toddler
Jackie	29	Toddler
June	27	Toddler
Larry	23	Toddler
Matt	37	Preschool 1
Michelle	28	Toddler

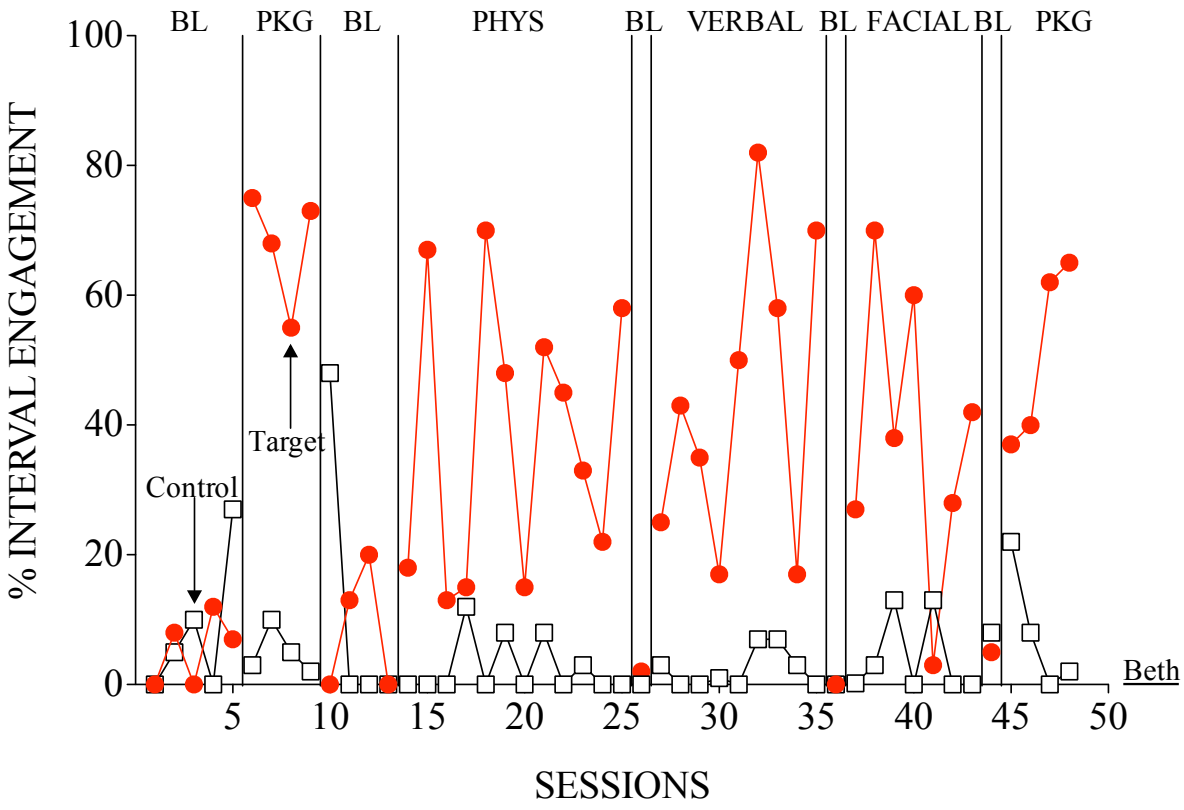

Figure 15. Percentage of 5-s intervals with engagement with the target and control task for a participant for whom all forms of attention functioned as a reinforcer.

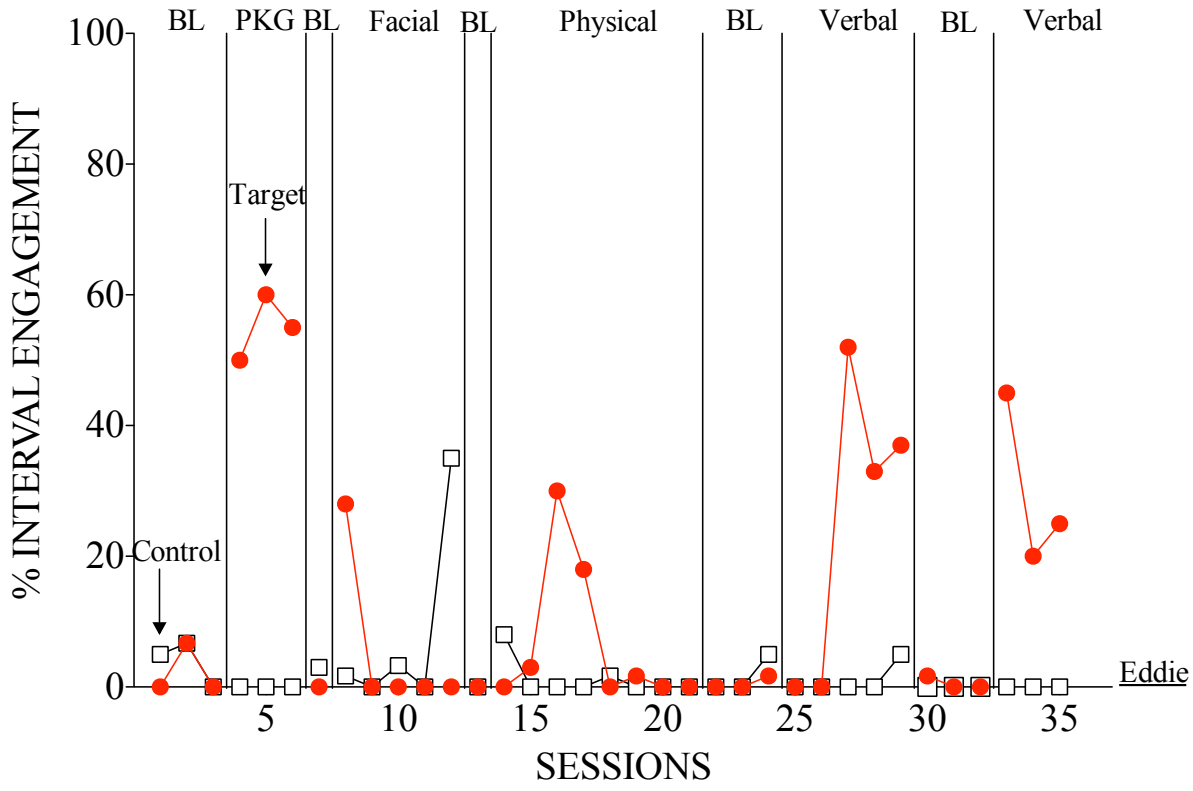

Figure 16. Percentage of 5-s intervals with engagement with the target and control task for a participant for whom package attention and verbal attention functioned as a reinforcer

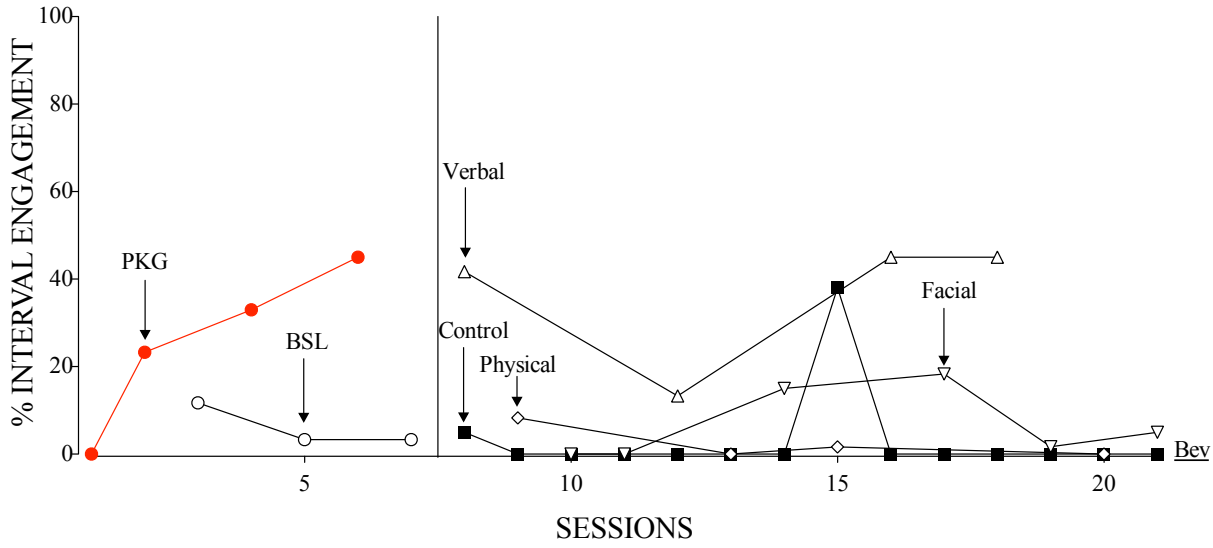

Figure 17. Percentage of 5-s intervals with engagement with the target and control task for a participant for whom package attention and verbal attention functioned as a reinforcer.

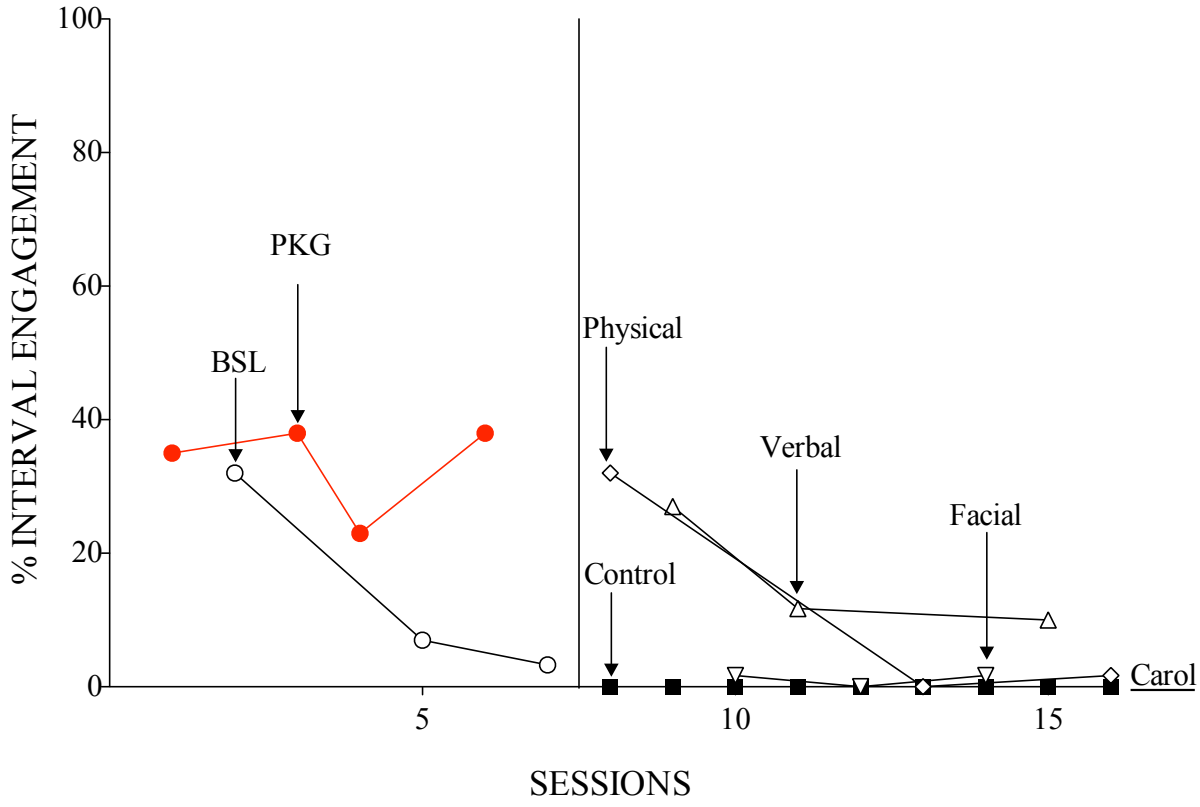

Figure 18. Percentage of 5-s intervals with engagement with the target and control task for a participant for whom package attention and verbal attention functioned as a reinforcer.

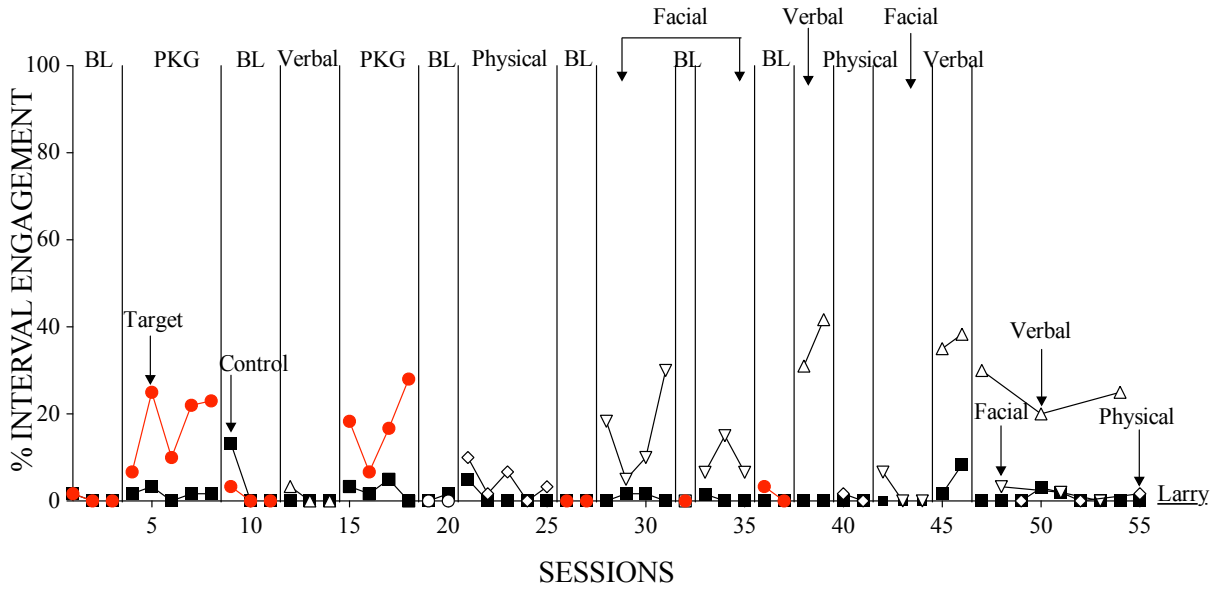

Figure 19. Percentage of 5-s intervals with engagement with the target and control task for a participant for whom package attention and verbal attention functioned as a reinforcer.

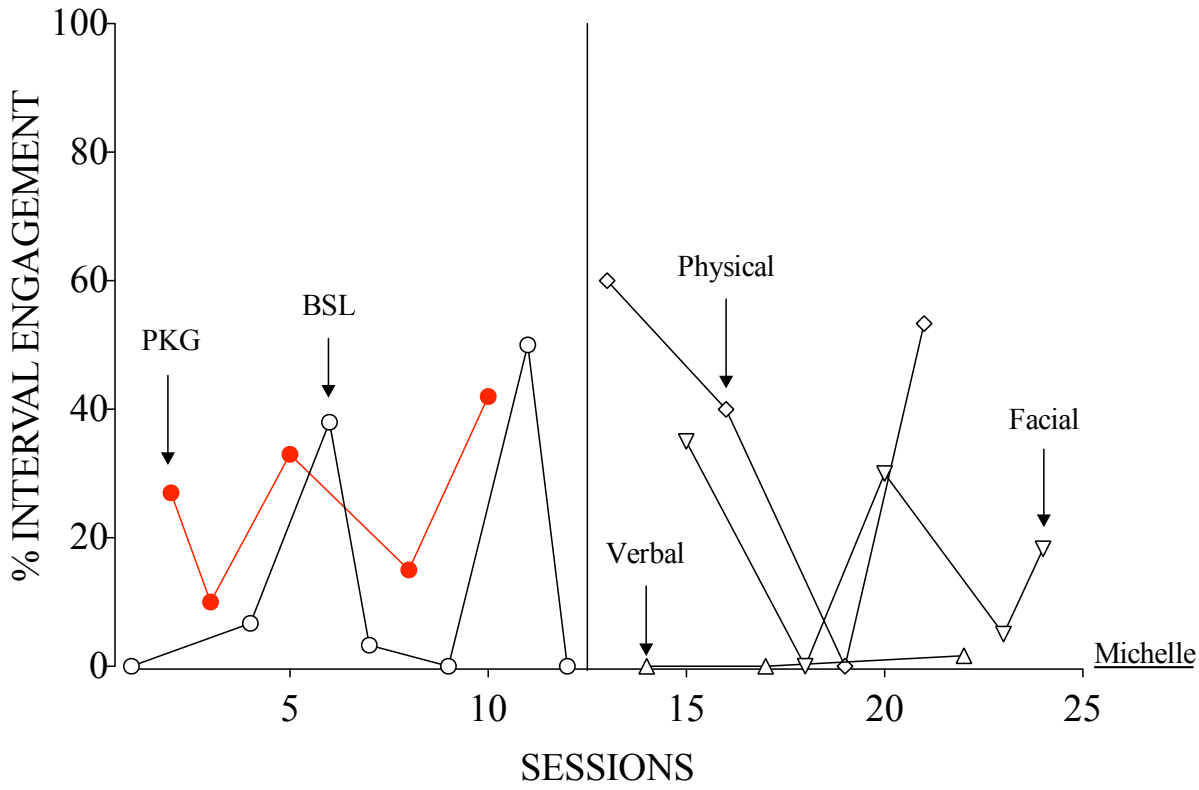

Figure 20. Percentage of 5-s intervals with engagement with the target and control task for a participant for whom package attention, physical attention, and facial attention functioned as a reinforcer.

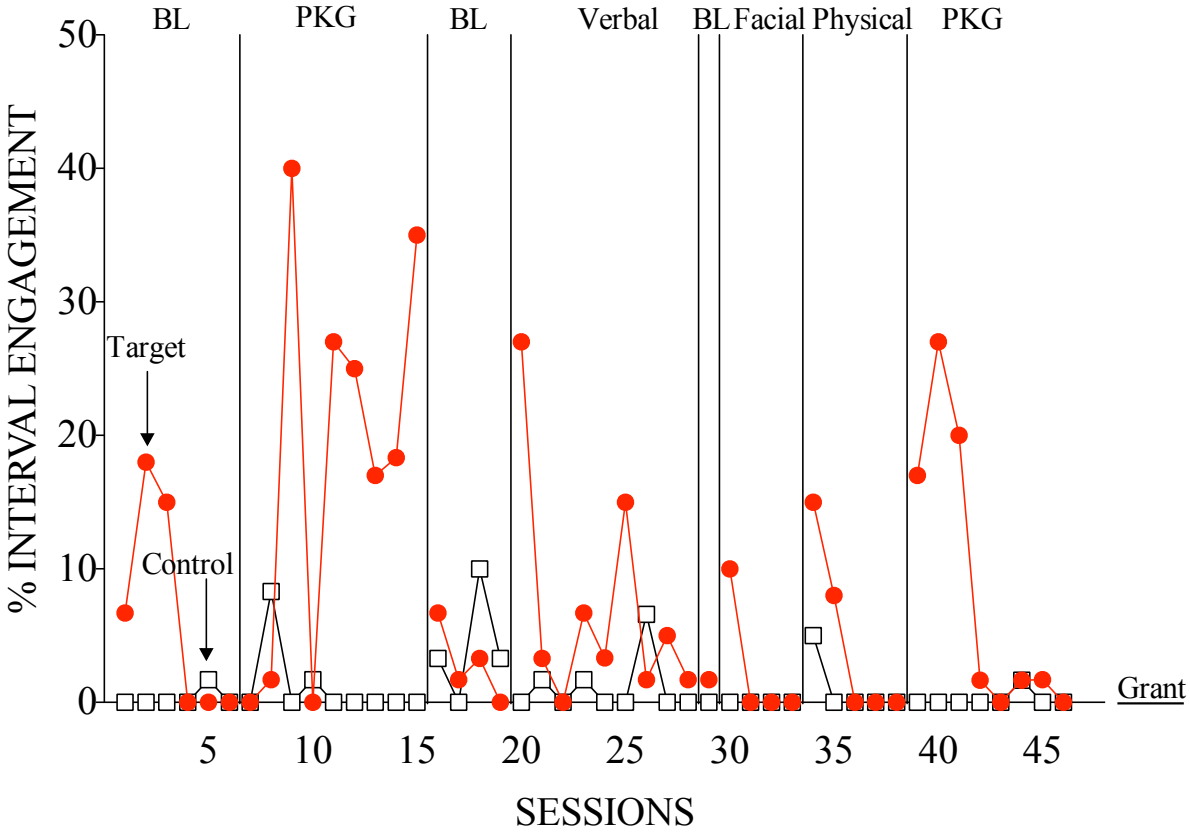

Figure 21. Percentage of 5-s intervals with engagement with the target and control task for a participant for whom package and verbal attention initially functioned as a reinforcer but the results were not maintained.

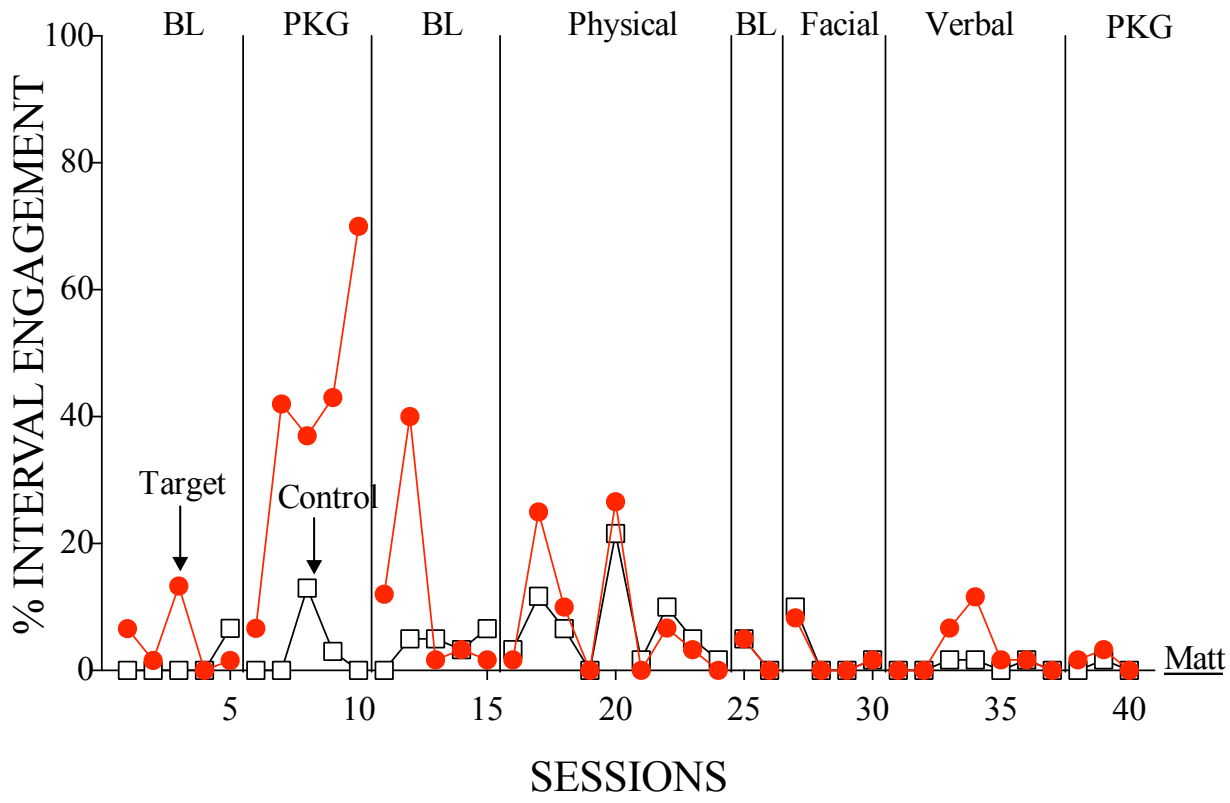

Figure 22. Percentage of 5-s intervals with engagement with the target and control task for a participant for whom package attention initially functioned as a reinforcer but the results were not maintained.

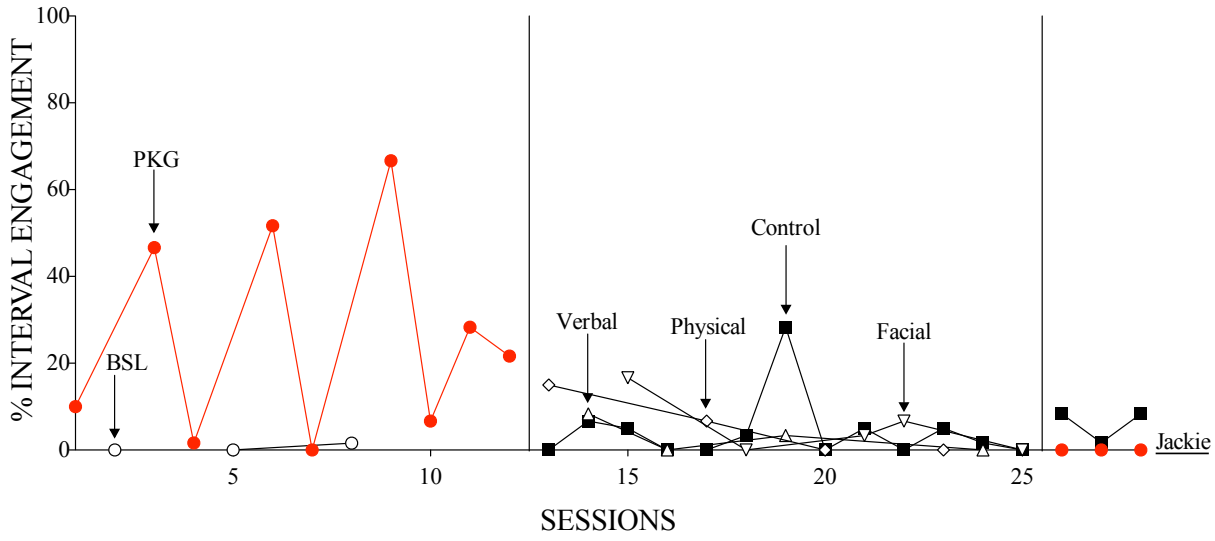

Figure 23. Percentage of 5-s intervals with engagement with the target and control task for a participant for whom package attention initially functioned as a reinforcer but the results were not maintained.

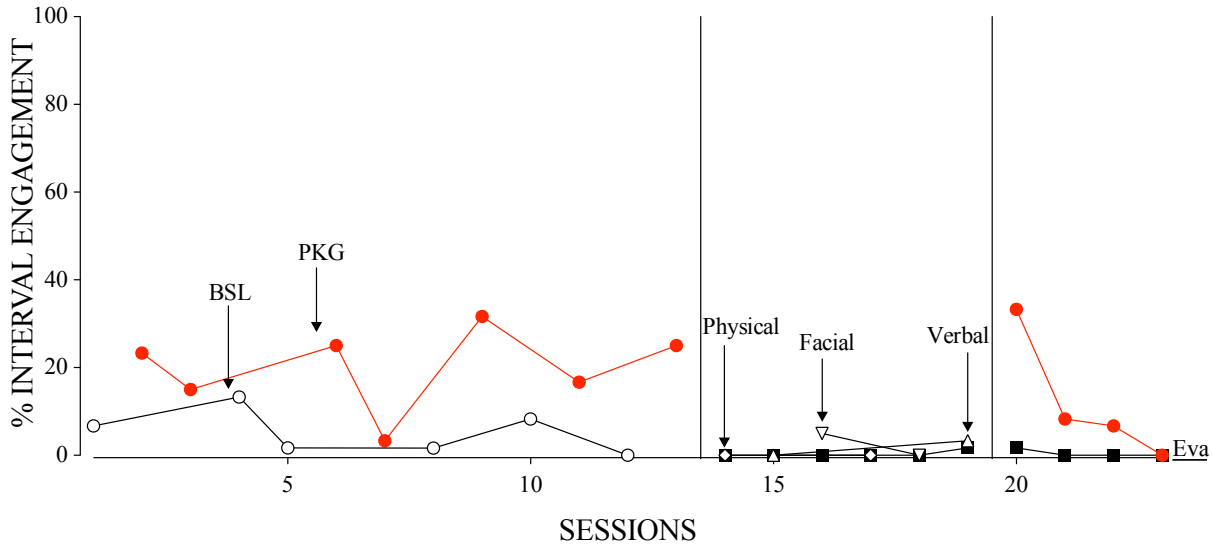

Figure 24. Percentage of 5-s intervals with engagement with the target and control task for a participant for whom package attention initially functioned as a reinforcer but the results were not maintained.

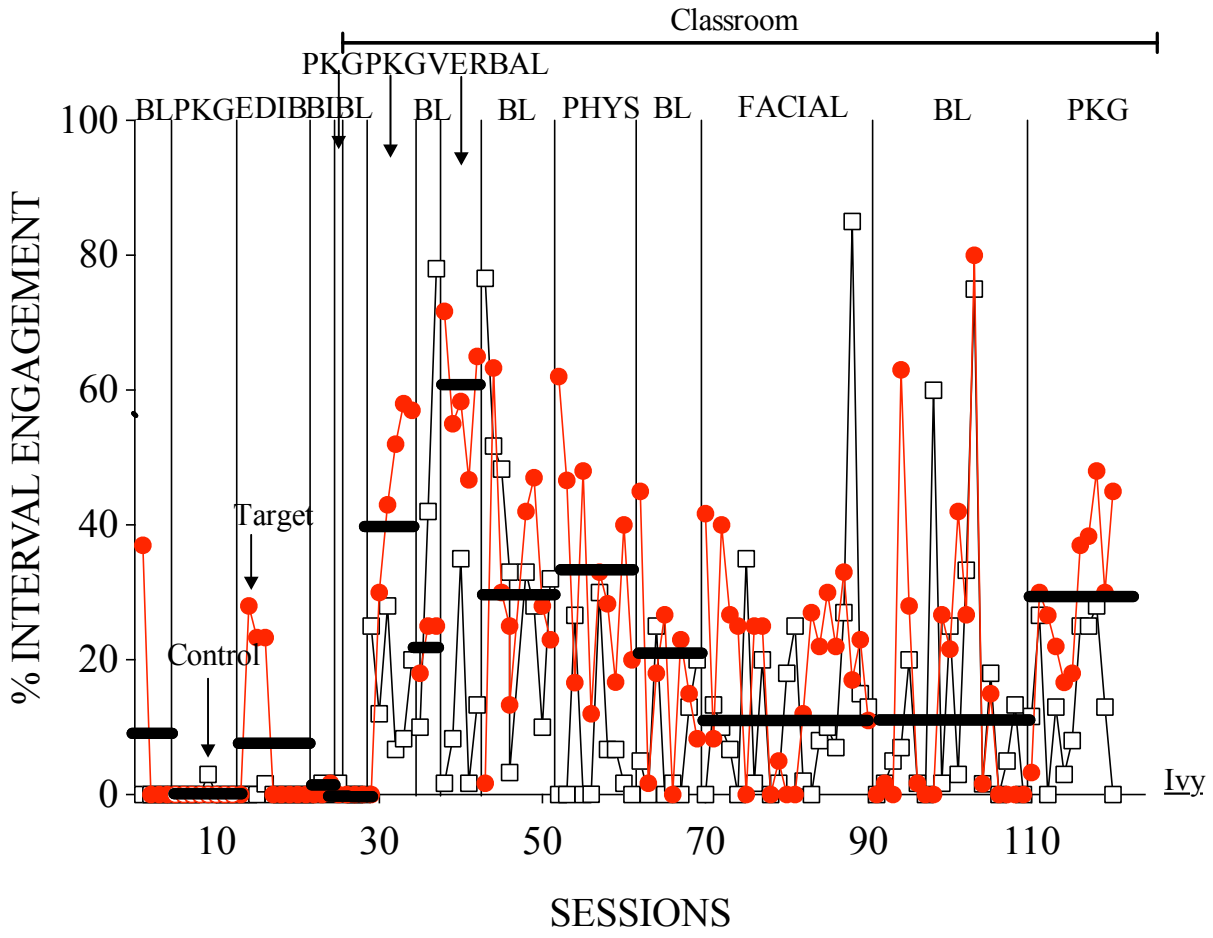

Figure 25. Percentage of 5-s intervals with engagement with the target and control task for a participant for whom package, verbal attention, and physical attention functioned as a reinforcer

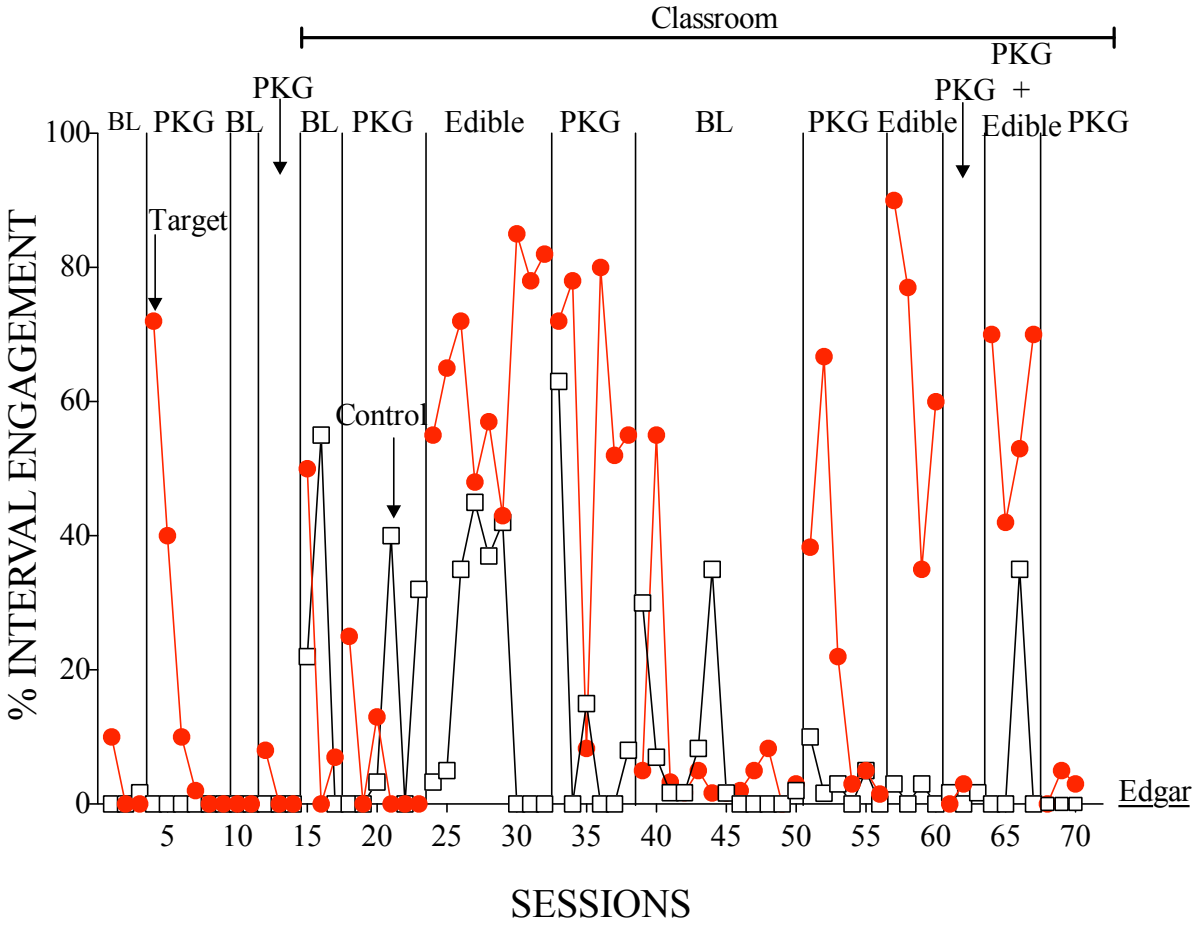

Figure 26. Percentage of 5-s intervals with engagement with the target and control task for a participant for whom package attention functioned as a reinforcer following edible reinforcement and when paired with edible reinforcement.

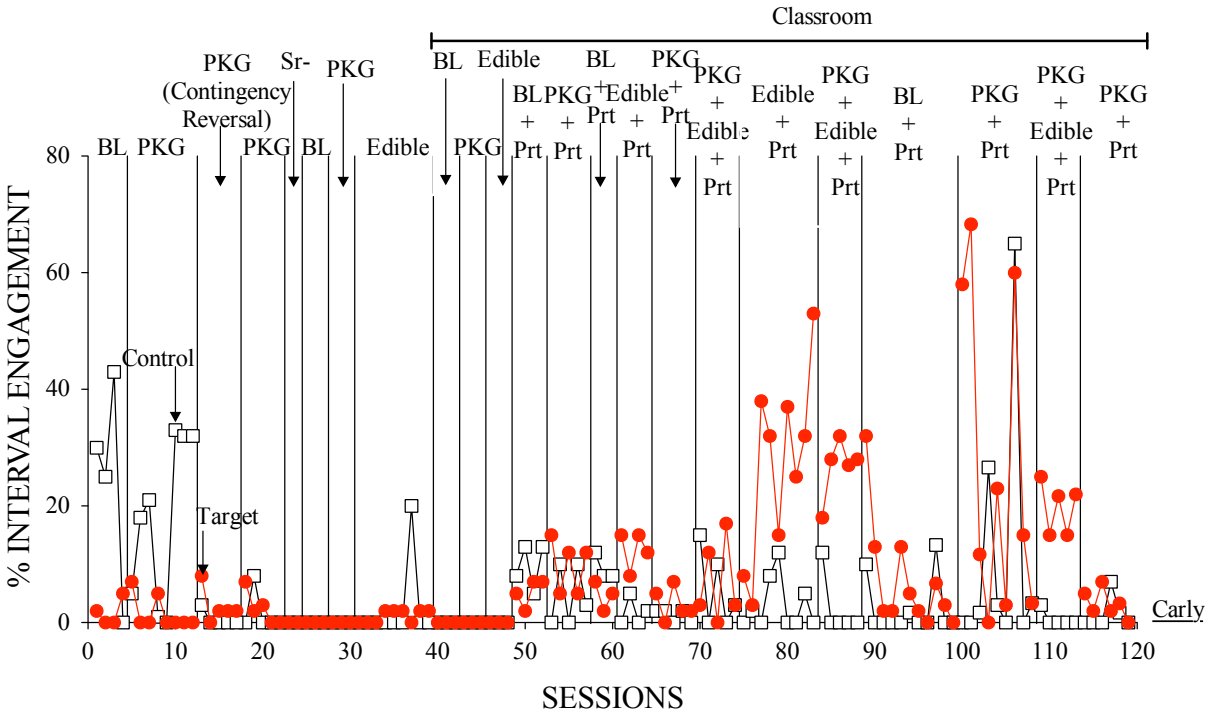

Figure 27. Percentage of 5-s intervals with engagement with the target and control task for a participant for whom

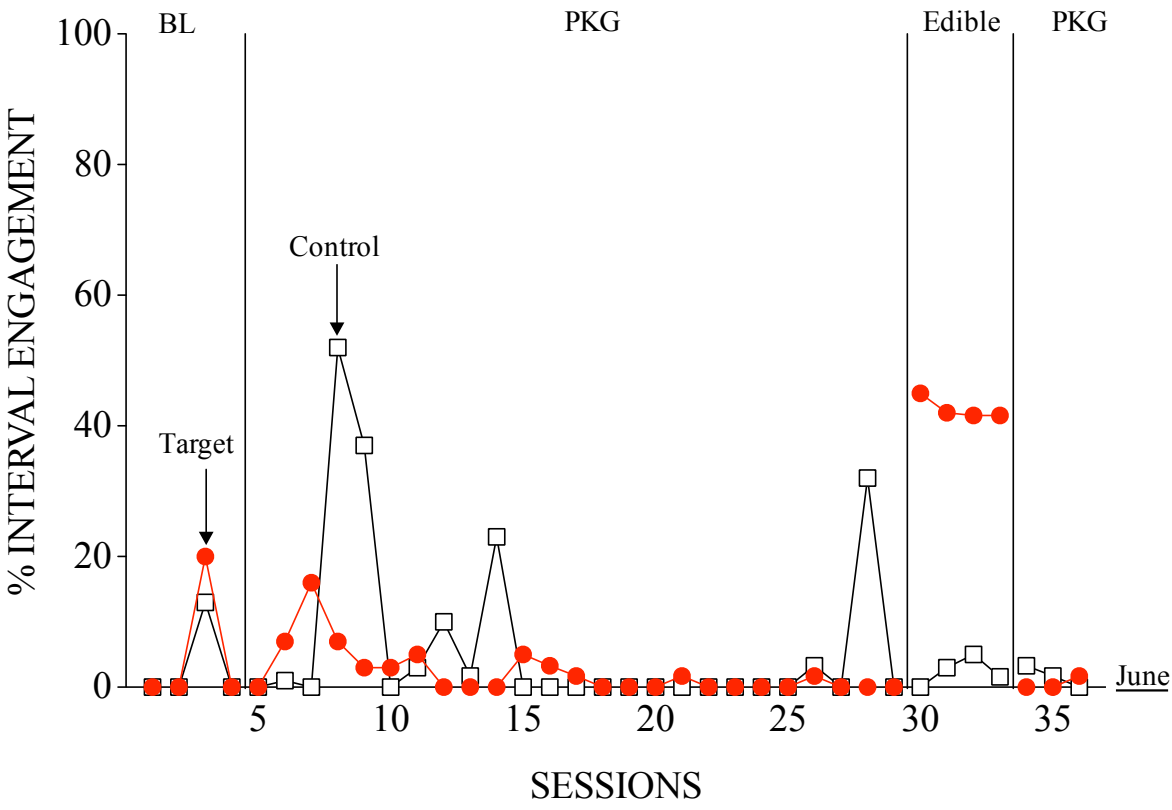

Figure 28. Percentage of 5-s intervals with engagement with the target and control task for a participant for whom attention did not function as a reinforcer.

Table 2

Summary of the idiosyncratic effects of attention of the behavior of young children.

	Package	Initial Package Effect- No Maintenance	No Effect	Verbal	Physical	Facial
Beth	X			X	X	X
Eddie	X			X		
Carol	X			X		
Larry	X			X		
Bev	X			X		
Ivy	X			X	X	
Michelle	X				X	X
Grant		X				
Eva		X				
Matt		X				
Jackie		X				
Edgar			X			
June			X			
Carly			X			
Total	7/14	5/14	3/14	6/12	3/12	2/12